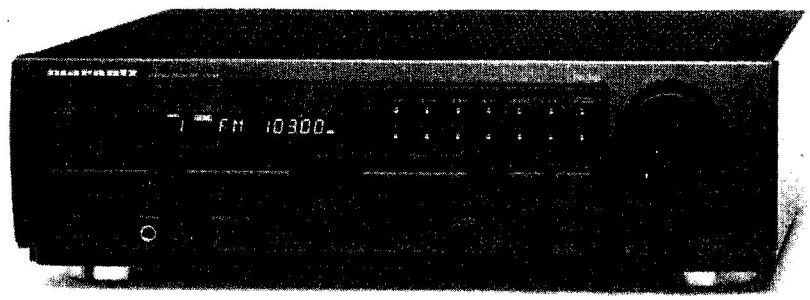
Service Manual

74 SR65/01B/01G/02B/02G/05B/07B

Stereo Receiver



Model 74 SR65/02B

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Please use this service manual with referring to the user guide (D.F.U.) without fail.

marantz®

model SR-65

First issue : 1995

PCS 86 070

4822 725 51080

MARANTZ DESIGN AND SERVICE

Using superior design and selected high grade components, **MARANTZ** company has created the ultimate in stereo sound. Only original **MARANTZ** parts can insure that your **MARANTZ** product will continue to perform to the specifications for which it is famous.

Parts for your **MARANTZ** equipment are generally available to our National Marantz Subsidiary or Agent.

ORDERING PARTS:

Parts can be ordered either by mail or by Fax.. In both cases, the correct part number has to be specified.

The following information must be supplied to eliminate delays in processing your order:

1. Complete address
2. Complete part numbers and quantities required
3. Description of parts
4. Model number for which part is required
5. Way of shipment
6. Signature: any order form or Fax. must be signed, otherwise such part order will be considered as null and void.

USA

MARANTZ AMERICA, INC.
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ROSELLE, ILLINOIS 60172-2330
USA
PHONE : 708-307-3100
FAX : 708-307-2687

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営業本部〒150 東京都渋谷区恵比寿南1丁目11番9号

SHOCK, FIRE HAZARD SERVICE TEST:

CAUTION: After servicing this appliance and prior to returning to customer, measure the resistance between either primary AC cord connector pins (with unit NOT connected to AC mains and its Power switch ON), and the face or Front Panel of product and controls and chassis bottom.

Any resistance measurement less than 1 Megohms should cause unit to be repaired or corrected before AC power is applied, and verified before it is return to the user/customer.

Ref. UL Standard NO.1492.

In case of difficulties, do not hesitate to contact the Technical Department at above mentioned address.

SPECIFICATION

FM TUNER SECTION

Frequency range ..... 87.5 ~ 108 MHz
Sensitivity
DIN mono (s/n 26 dB 75 Ohms) ..... 0.9 µV
DIN stereo (s/n 46 dB 75 Ohms) ..... 25 µV
Selectivity adjacent channel 98 MHz ..... 65 dB
Tuner output (1 kHz 75 kHz deviation) ..... 1200 mV
Signal to noise ratio
S/N DIN weighted mono ..... 80 dB
S/N DIN weighted stereo ..... 73 dB
Total harmonic distortion mono ..... 0.1 %
Total harmonic distortion stereo ..... 0.2 %
Accuracy of frequency response across 30 Hz~15 kHz bandwidth ..... +0.5 / –1.5 dB

MW TUNER SECTION

Frequency range ..... /01 version: 520 ~ 1710 kHz
..... 531 ~ 1602 kHz
..... /02 and /05 version: 531 ~ 1602 kHz
Sensitivity (s/n 20 dB 30% mod. 999 kHz) ..... 400 µV/m
Selectivity 999 kHz ..... 35 dB
Signal to noise ratio at 999 kHz ..... 54 dB

LW TUNER SECTION

Frequency range ..... 153 ~ 281 kHz
Sensitivity (s/n 20 dB 30% mod. 207 kHz) ..... 800 µV/m
Signal to noise ratio at 207 kHz ..... 52 dB

AMPLIFIER SECTION

Power output — DIN 4 Ω ..... 80 W
DIN 8 Ω ..... 56 W
RMS 8 Ω ..... 55 W
Dynamic power 8 Ω / 4 Ω ..... 80 / 130 W
T.H.D. at 8 Ω rated RMS output ..... 0.07 %
Damping factor 82
Input sensitivity — : PHONO ..... 2.5 mV / 47 kΩ
: CD / AUX / TAPE / DCC / VCR ..... 200 mV / 47 kΩ
S/N — : PHONO ..... 79 dB
: CD / AUX / TAPE / DCC / VCR ..... 96 dB

POWER REQUIREMENTS

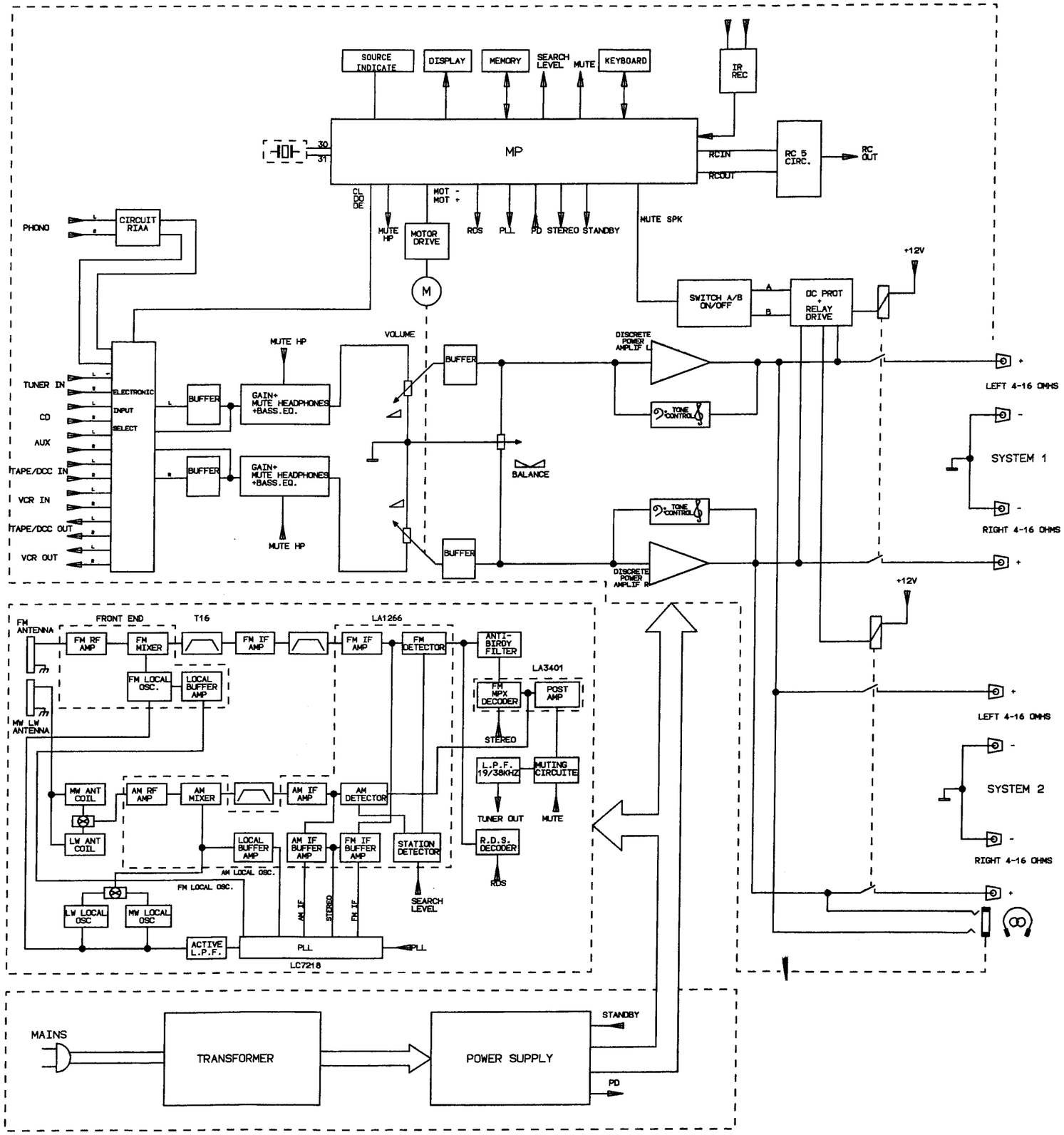
/ 02 version ..... 230 V AC, 50 / 60 Hz
/ 05, / 07 version ..... 240 V AC, 50 / 60 Hz
/ 01 version (4 voltages) ..... 110 / 120 / 220 / 240 V AC, 50 / 60 Hz

DIMENSIONS

Width ..... 420 mm
Height ..... 132 mm
Depth ..... 334 mm

WEIGHT ..... 8.5 kg

1. BLOCK DIAGRAM



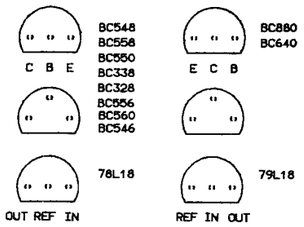
RESISTOR

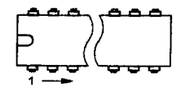
- KSW 0204 DIN
- MSW 0204 DIN
- KSW 0207 DIN
- MSW 0207 DIN
- KSW 0309 DIN / KSW 0411 DIN
- KSW 0617 DIN
- MSW 0309 DIN
- NTC
- MSW 0414 DIN
- WIRE
- METAL OXIDE
- LOW NOISE
- LOW FLAMMABILITY
- SAFETY RESISTOR

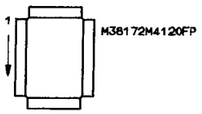
CAPACITOR

- ELECTROLYTIC
- TANTALUM ELECTROLYTIC
- FOIL
- CERAMIC
- MULTILAYER
- POLYPROPYLEN (KS-KP)

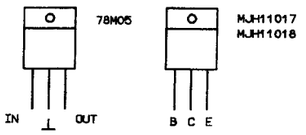
TOP VIEW







FRONT VIEW



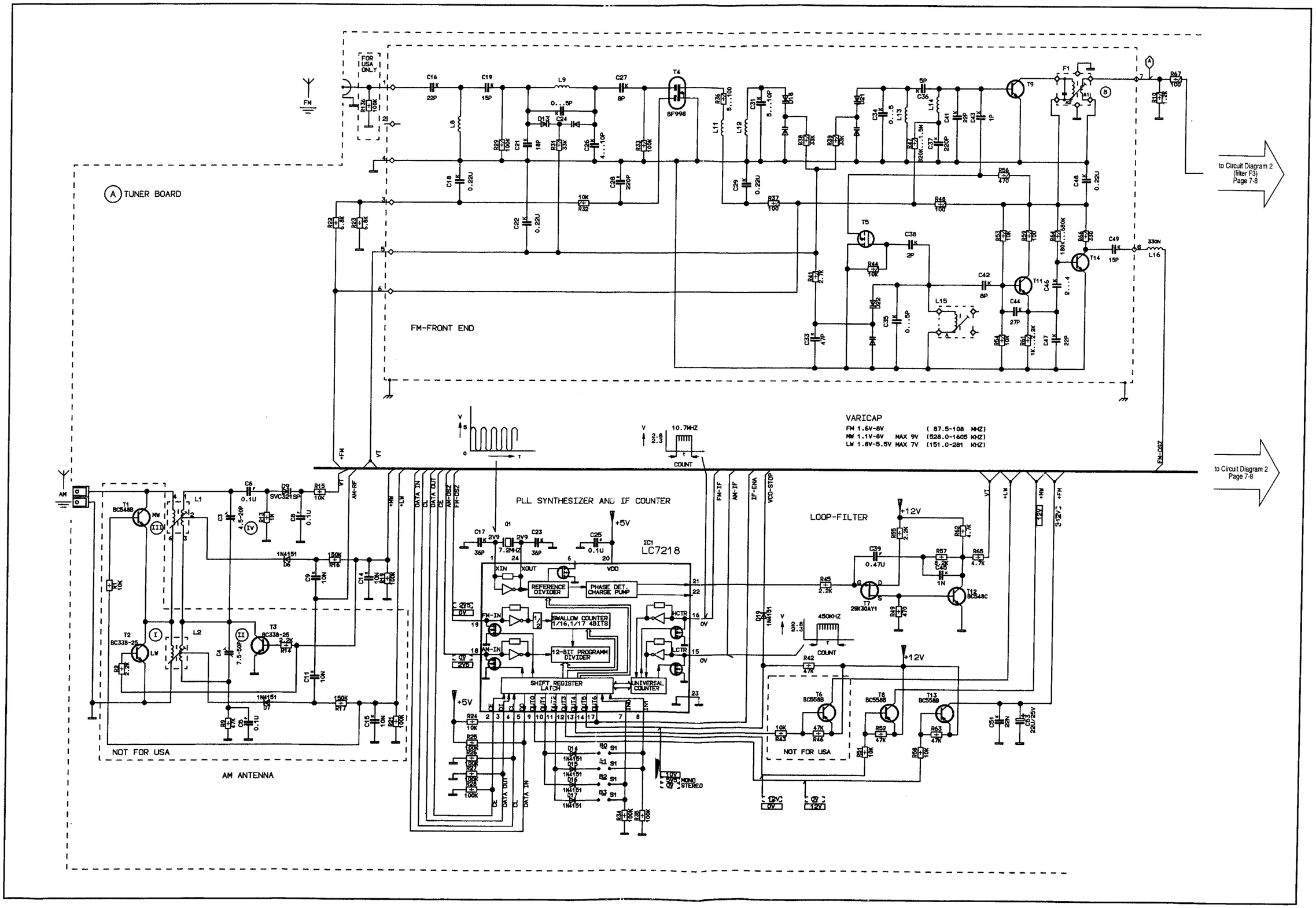
ATTENTION!
OBSERVE MOS COMPONENTS HANDLING INSTRUCTIONS WHEN SERVICING!

⚠ ABSOLUTELY NECESSARY FOR THE SAFETY OF THE SET. THESE COMPONENTS MEET THE SAFETY REQUIREMENTS ACCORDING TO VDE OR IEC. RESP. AND MUST BE REPLACED BY PARTS OF SAME SPECIFICATION ONLY.

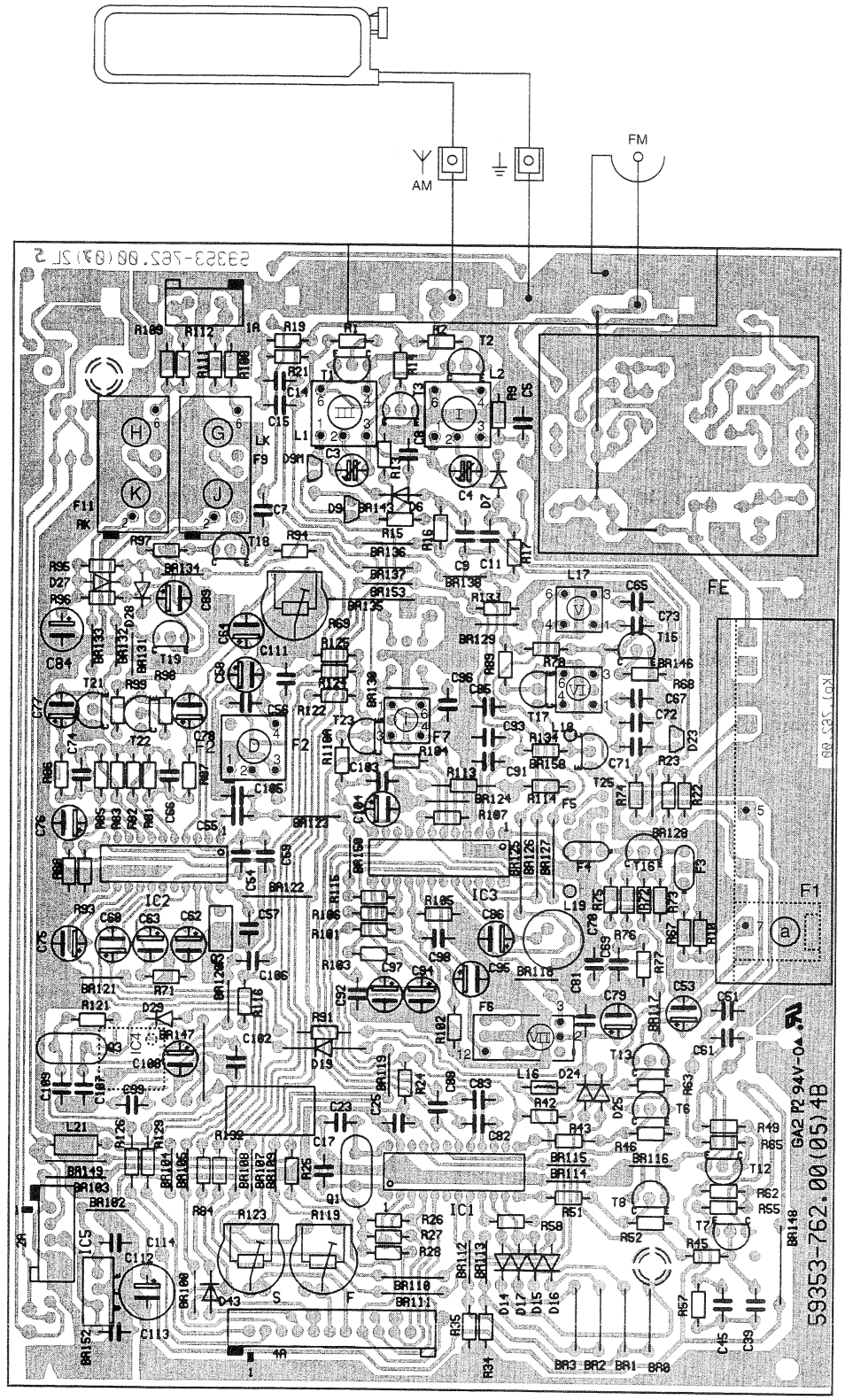
IF NOT OTHERWISE INDICATED ALL VOLTAGES ARE MEASURED AGAINST CHASSIS WITH A VOLTMETER (RI=10M).

2. SCHEMATIC DIAGRAM AND PCBS

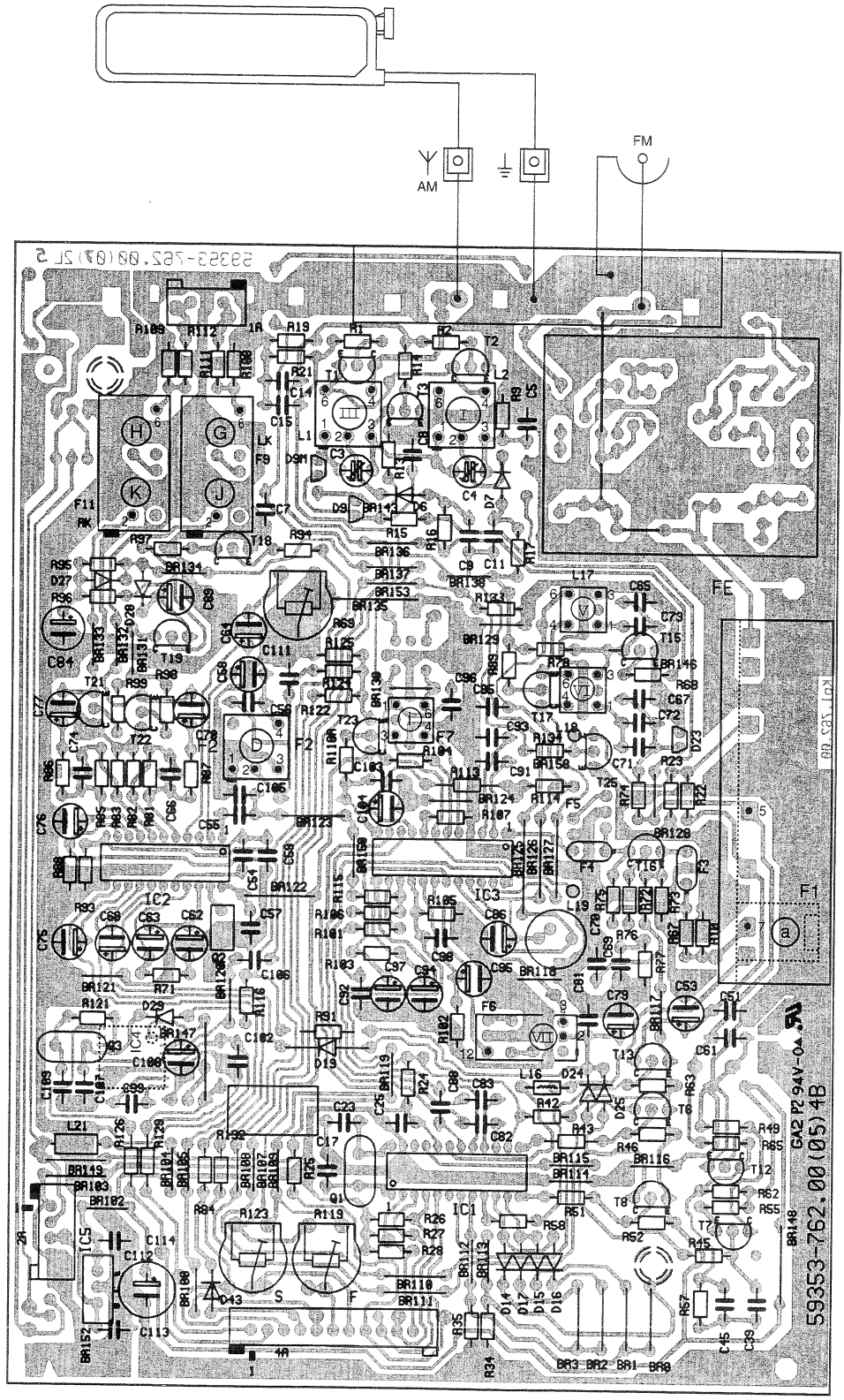
2.1 SCHEMATIC DIAGRAM TUNER BOARD - PART 1



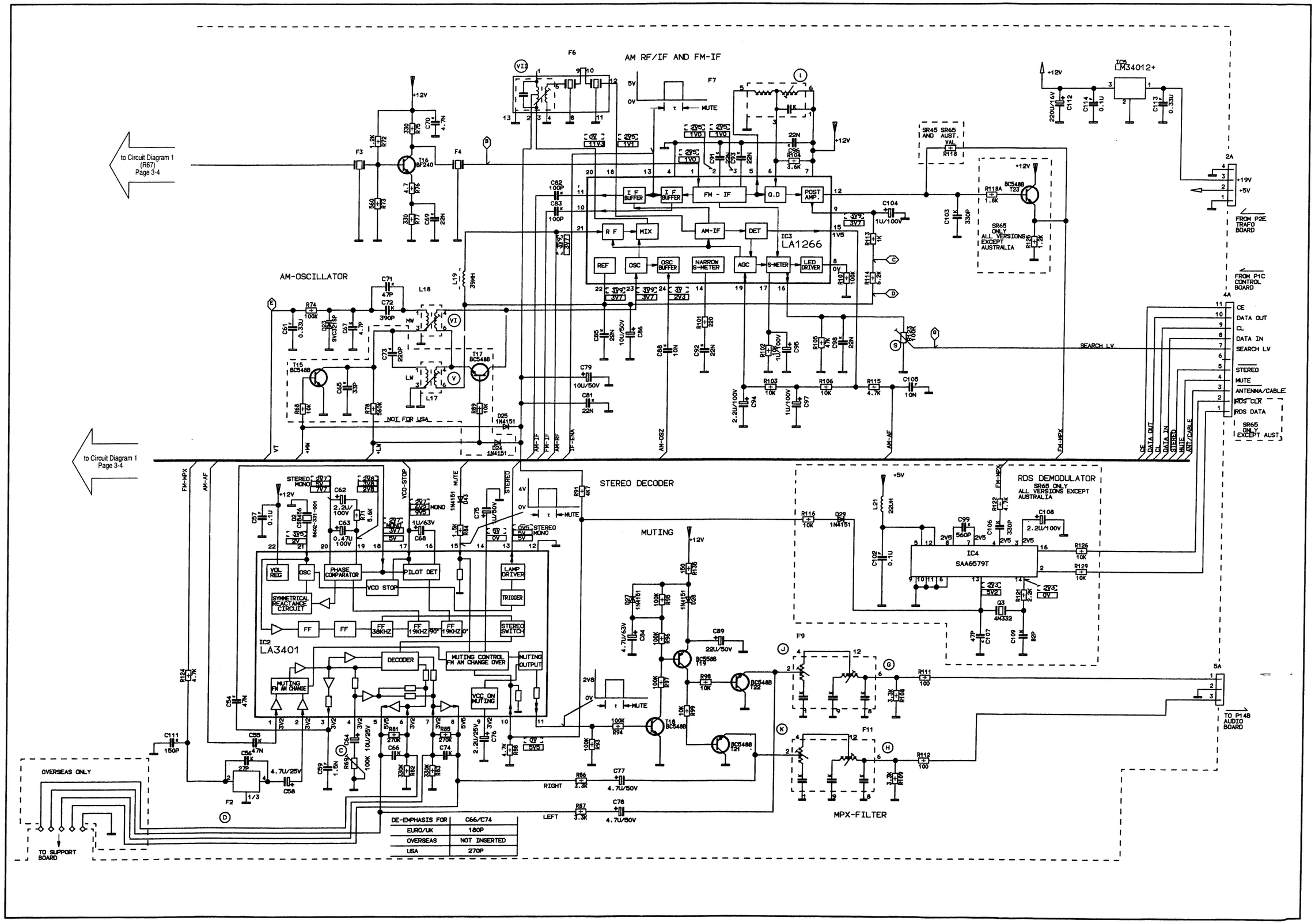
2.2 TUNER PCB
(component side)



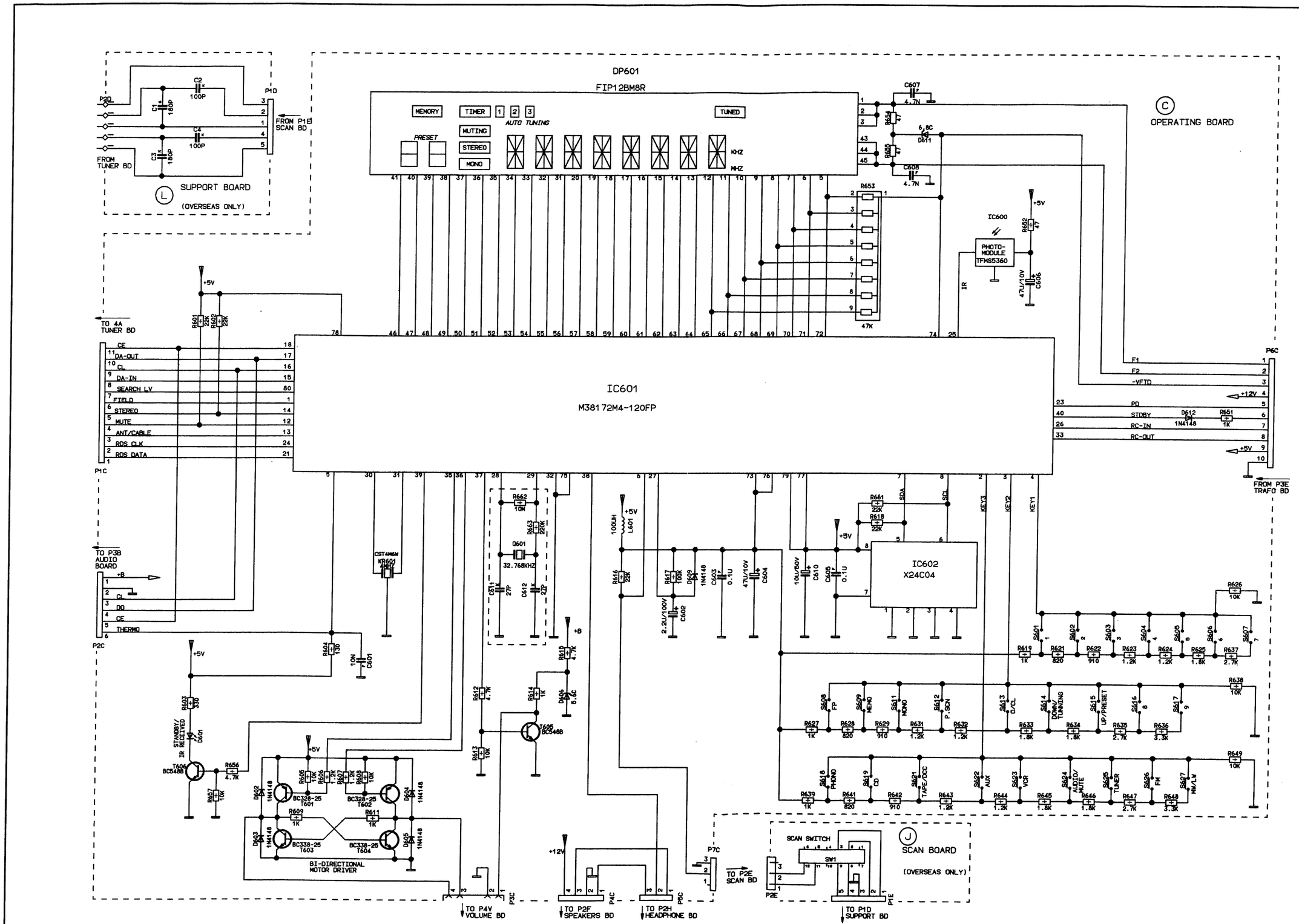
2.2 TUNER PCB
(component side)



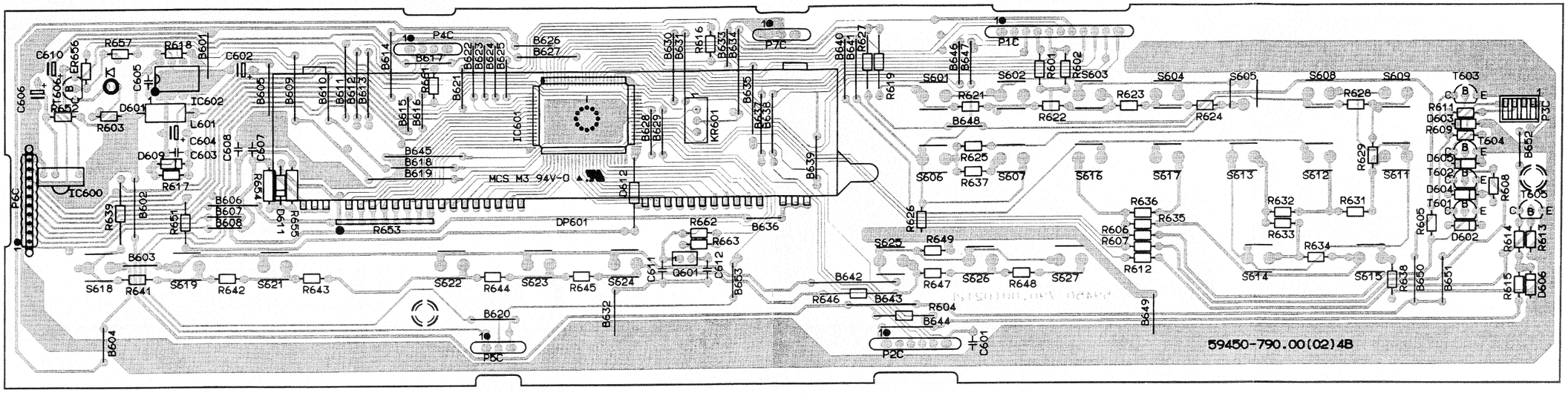
2.3 SCHEMATIC DIAGRAM TUNER BOARD - PART 2



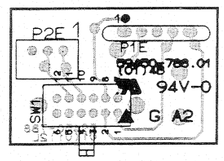
2.4 SCHEMATIC DIAGRAM: OPERATING BOARD, SUPPORT BOARD, SCAN BOARD



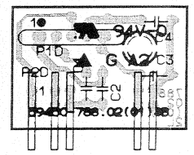
2.5.1 CONTROL PCB
(component side)



2.5.2 SCAN PCB
(component side)

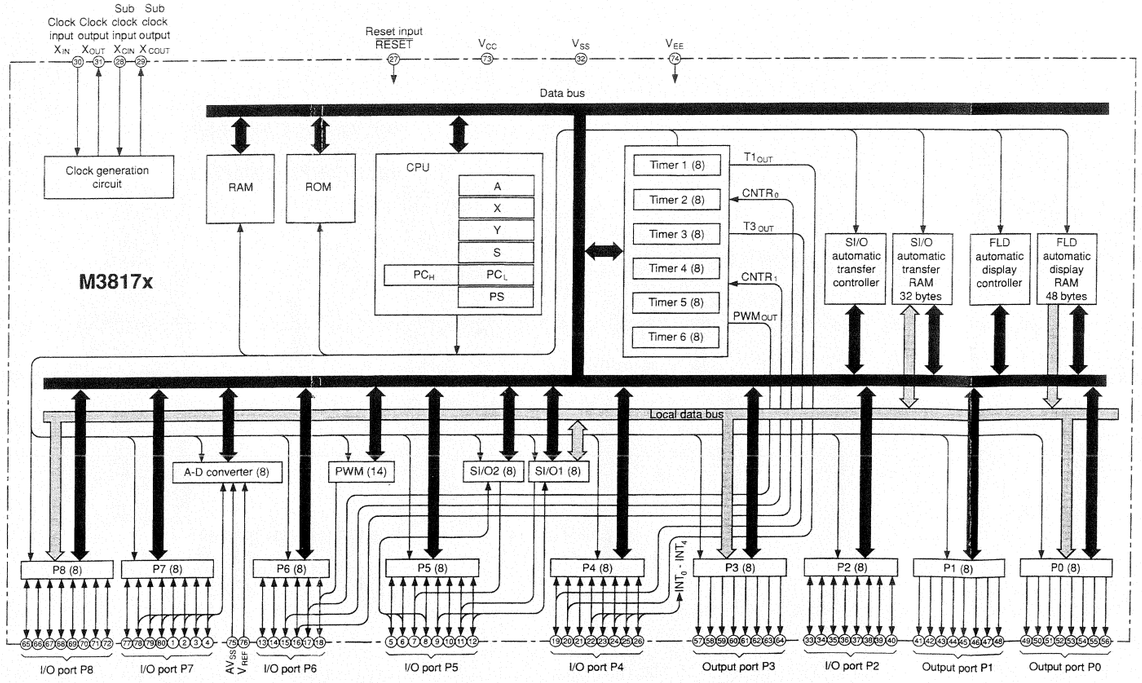


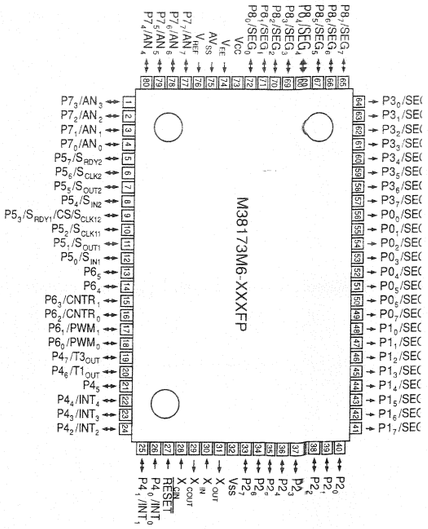
2.5.3 SUPPORT PCB
(component side)

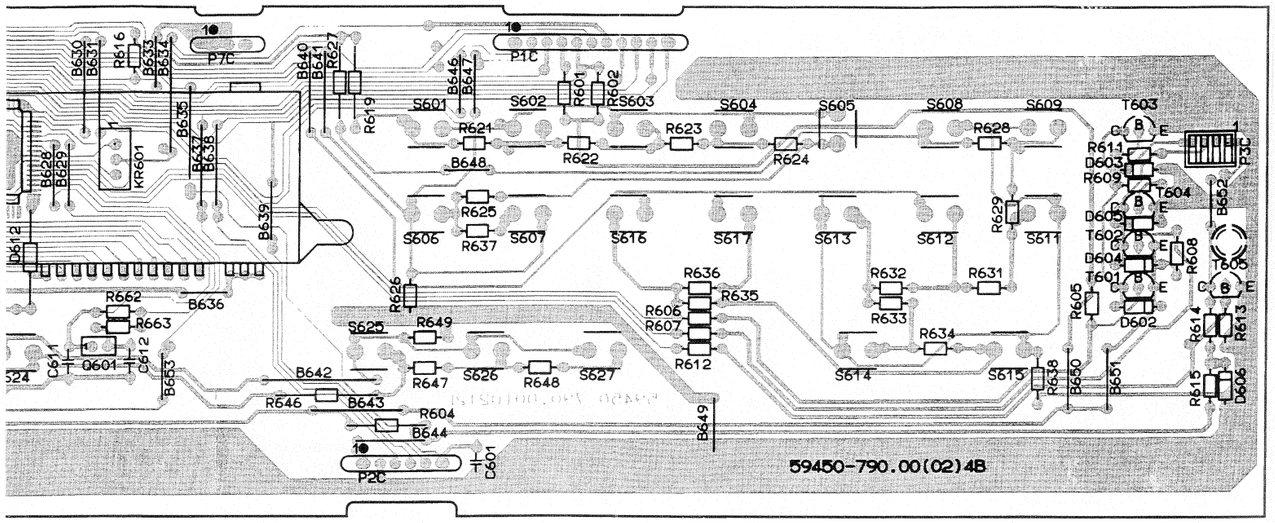


PIN DESCRIPTION M3817x

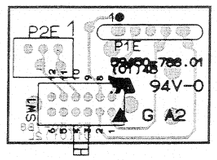
Pin		Name	Function	Alternate Function
73, 32	V_{CC}, V_{SS}	Power supply	Power supply inputs 4.0 to 5.5V to V_{CC}, and 0V to V_{SS}.	
74	V_{EE}	Pull-down power input	Applies voltage supplied to pull-down resistors of ports P0, P1, P2 and P3.	
76	V_{REF}	Analog reference voltage	Reference voltage input pin for A-D converter.	
75	AV_{SS}	Analog power voltage	GND input pin for A-D converter. Keep at the same potential as V_{SS}.	
27	$\overline{RESET}$	Reset input	To reset the microcomputer, this pin should be kept at an "L" level for more than 2µs under high-speed operating conditions. In low-speed operation start mode, internal reset is not released until the X_{CIN} - X_{COUT} clock has had time to stabilize.	
30	X_{IN}	Clock input	Input and output signals for the internal clock generation circuit. It consist of internal feedback amplifier. Connect a ceramic resonator or quartz crystal between the X_{IN} and X_{OUT} pins to set the oscillation frequency. If an external clock is used, connect the clock source to the X_{IN} pin and leave the X_{OUT} pin open. This clock is used as system clock.	
31	X_{OUT}	Clock output		
28	X_{CIN}	Sub clock input	Input and output signals for the internal sub clock generation circuit. It consist of internal amplifier without feedback. Connect a ceramic resonator or quartz crystal and external feedback resistor between the X_{CIN} and X_{COUT} pins. If an external clock is used, connect the clock source to the X_{CIN} pin and leave the X_{COUT} pin open. This clock can also be used as the system clock.	
29	X_{COUT}	Sub clock output		
56 - 49	$P0_0/SEG_{16}$/ DIG_0 - $P0_7/SEG_{23}$/ DIG_7	Output port P0	An 8-bit output port. The output structure is high-breakdown-voltage P-channel open drain with internal pull-down resistors connected between the output and the V_{EE} pin. Are "L" at reset.	FLD automatic display pins
48 - 41	$P1_0/DIG_8$ - $P1_7/DIG_{15}$	Output port P1	An 8-bit output port with the same function as port P0.	FLD automatic display pins
40 - 33	$P2_0$ - $P2_7$	I/O port P2	An 8-bit CMOS I/O port. An I/O direction register allows each pin to be individually programmed as either input or output. At reset this port is set to input mode. The input levels are TTL compatible.	
64 - 57	$P3_0/SEG_8$ - $P3_7/SEG_{15}$	Output port P3	An 8-bit output port with the same function as port P0.	FLD automatic display pins
26	$P4_0/INT_0$	Input port $P4_0$	A 1-bit CMOS input pin.	External interrupt input pin
25 - 22	$P4_1/INT_1$ - $P4_4/INT_4$	I/O port P4	A 7-bit CMOS I/O port with the same function as port P2, with CMOS compatible input levels.	External interrupt input pins
21	$P4_5$			
20, 19	$P4_6/T1_{OUT}$, $P4_7/T3_{OUT}$			Timer output pins
12 - 9	$P5_0/S_{IN1}$, $P5_1/S_{OUT1}$, $P5_2/S_{CLK11}$, $P5_3/S_{RDY1}$/ CS/S_{CLK12}	I/O port P5	An 8-bit I/O port with the same function as port P2. The output structure of this port is N-channel open drain, and the input levels are CMOS compatible. Keep the input voltage of this port between 0V and V_{CC}.	Serial I/O1 I/O pins
8 - 5	$P5_4/S_{IN2}$, $P5_5/S_{OUT2}$, $P5_6/S_{CLK2}$, $P5_7/S_{RDY2}$			Serial I/O2 I/O pins
18	$P6_0/PWM_0$	I/O port P6	A 6-bit CMOS I/O port with the same function as port P2, with CMOS compatible input levels.	14-bit PWM output pin
17	$P6_1/PWM_1$			8-bit PWM output pin
16, 15	$P6_2/CNTR_0$, $P6_3/CNTR_1$			Event counter input pins
14, 13	$P6_4$, $P6_5$			
4 - 1, 80 - 77	$P7_0/AN_0$ - $P7_7/AN_7$	I/O port P7	An 8-bit CMOS I/O port with the same function as port P2, with CMOS compatible input levels.	A-D converter input pins
72 - 65	$P8_0/SEG_0$ - $P8_7/SEG_7$	I/O port P8	An 8-bit I/O port with the same function as port P2. The output structure of this port is P-channel open drain, and the input levels are CMOS compatible. Please note that this port does not have internal pull-down resistors.	FLD automatic display pins



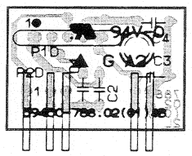


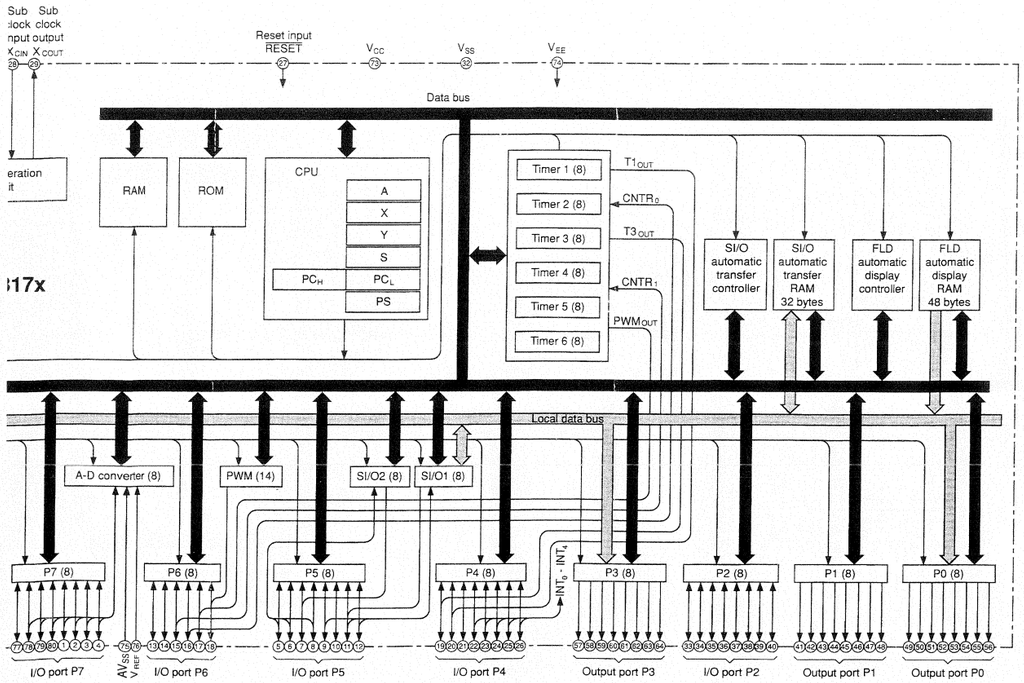


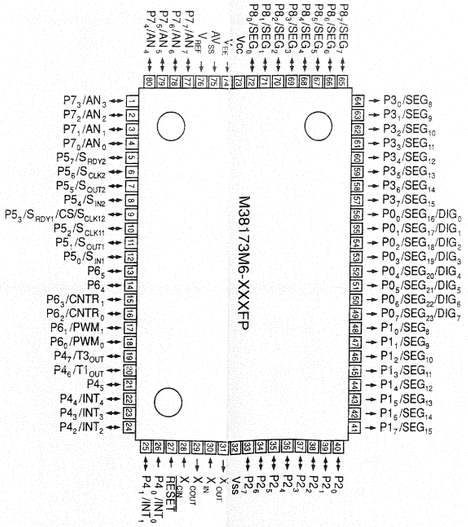
2.5.2 SCAN PCB
(component side)



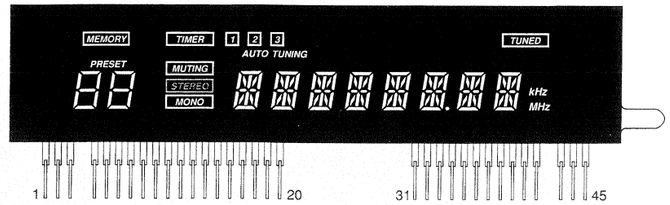
2.5.3 SUPPORT PCB
(component side)







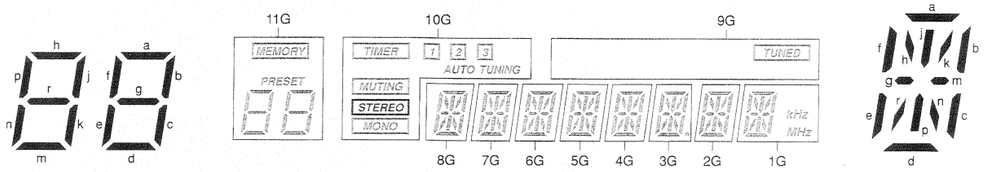
2.6 DISPLAY



PIN CONNECTION

TERMINAL NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
ELECTRODE	F 1	F 1	F 1	N P a	P b	P f	P g	P e	P c	P d	P h	P j	P k	P m	P n	P p	P r	P S15	P S16	N P	N P	N P	N P	N P	N P	N P	N P	N P	N P	11 10	10 9	9 8	8 7	7 6	6 5	5 4	4 3	3 2	2 1	1	N P	F 2	F 2	F 2

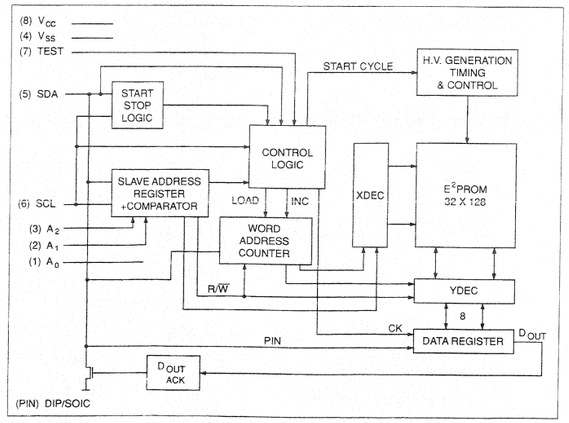
F --- Filament NP --- No Pin P --- Anode G --- Grid



ANODE CONNECTION

	11G	10G	9G	8G	7G	6G	5G	4G	3G	2G	1G
P a		3	-								
P b		2	-								
P f		1	-								
P g		TIMER	-								
P e		MUTING	-								
P c		STEREO	-								
P d		MONO	-								
P h		TUNING	-								
P j		AUTO	-								
P k		-	-								
P m		-	-								
P n		-	-								
P p		-	-								
P r		-	-								
P S15	PRESET	-	TUNED	-	-	-	-	-	-	-	MHz
P S16	MEMORY	-	-	-	-	-	-	-	-	-	kHz

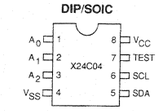
FUNCTIONAL DIAGRAM



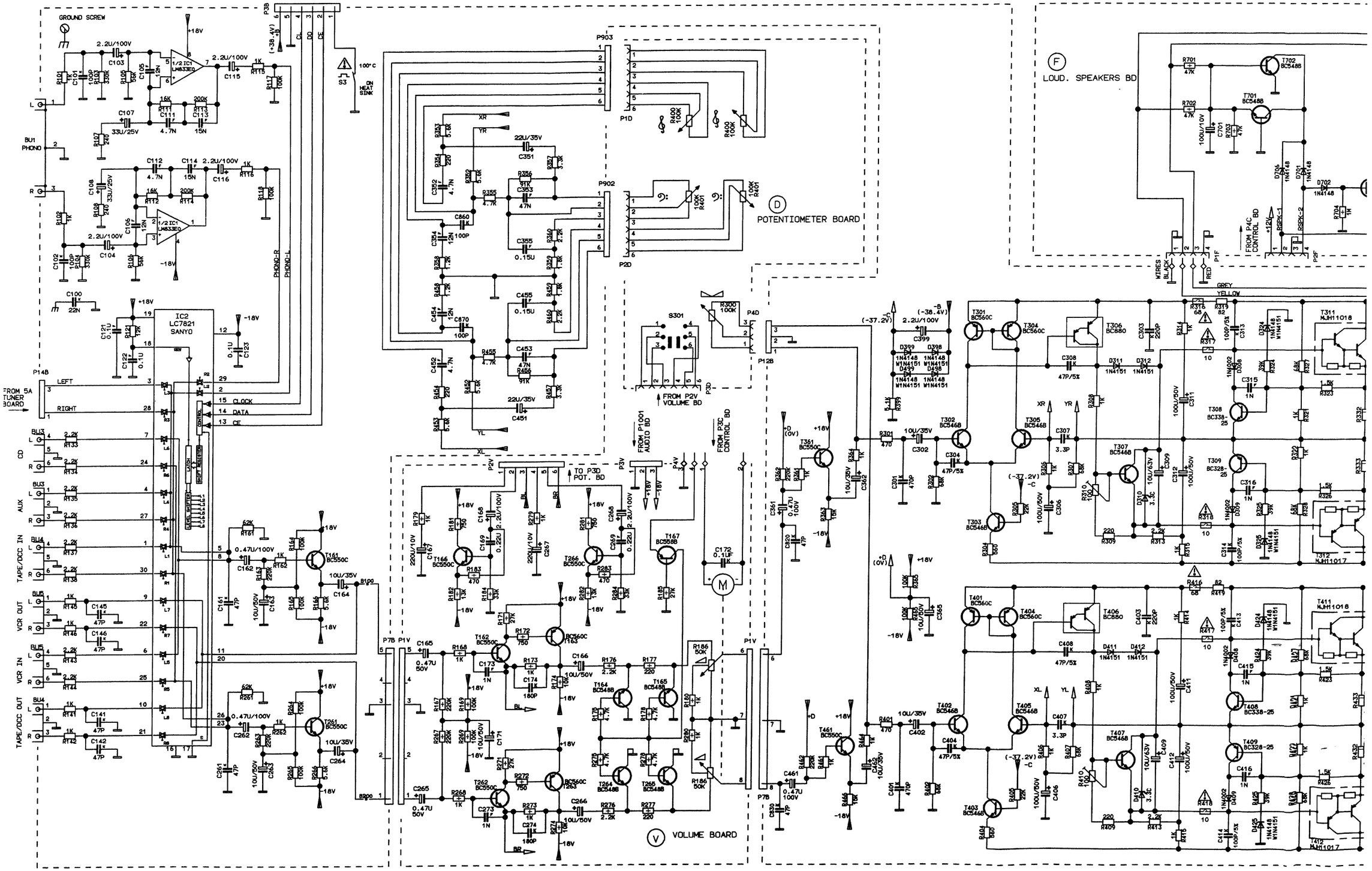
PIN NAMES

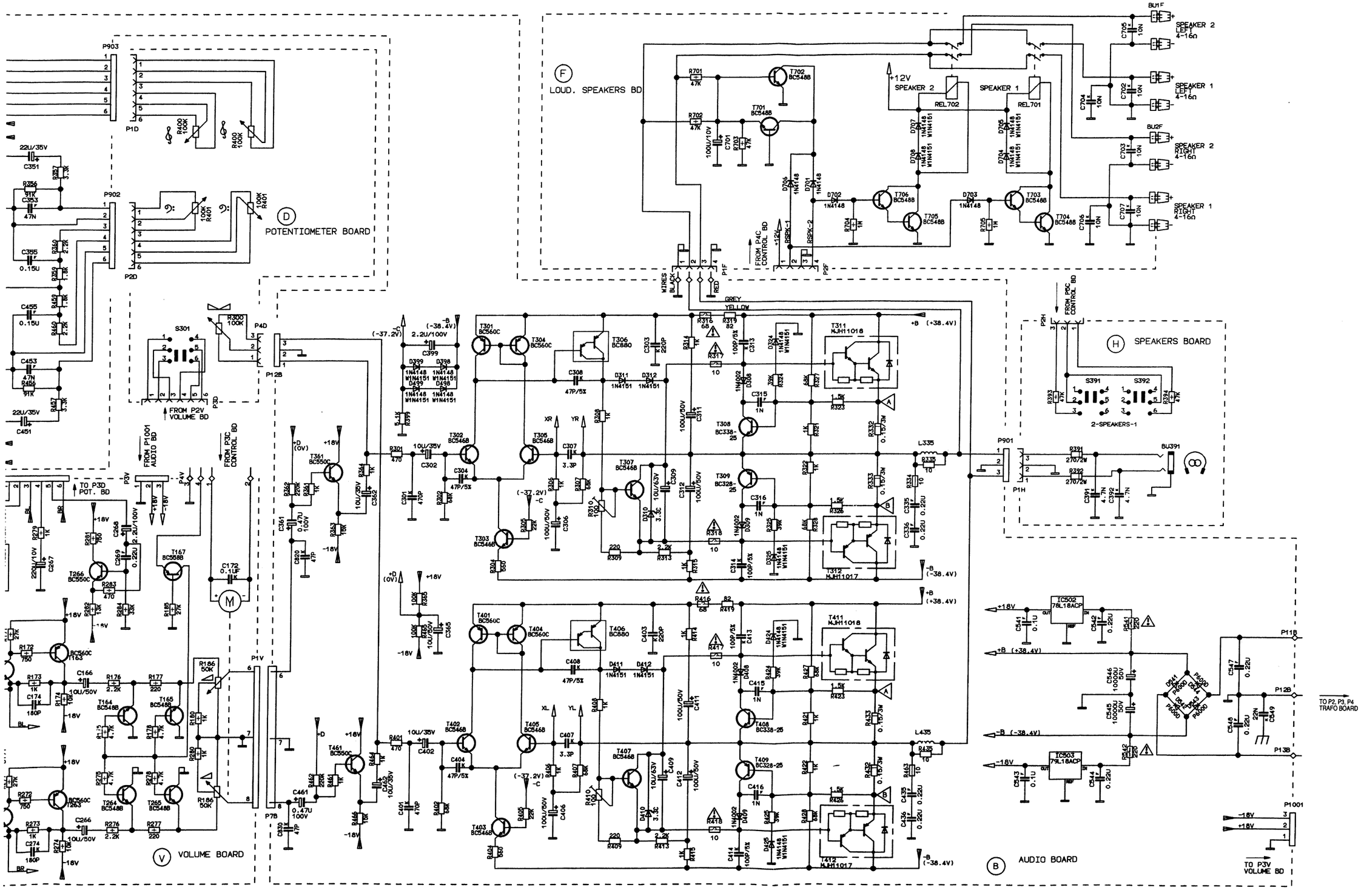
$A_0 - A_2$	Address Inputs
SDA	Serial Data
SCL	Serial Clock
TEST	Hold at V_{SS}
V_{SS}	Ground
V_{CC}	Supply Voltage
NC	No Connect

DIP/SOIC

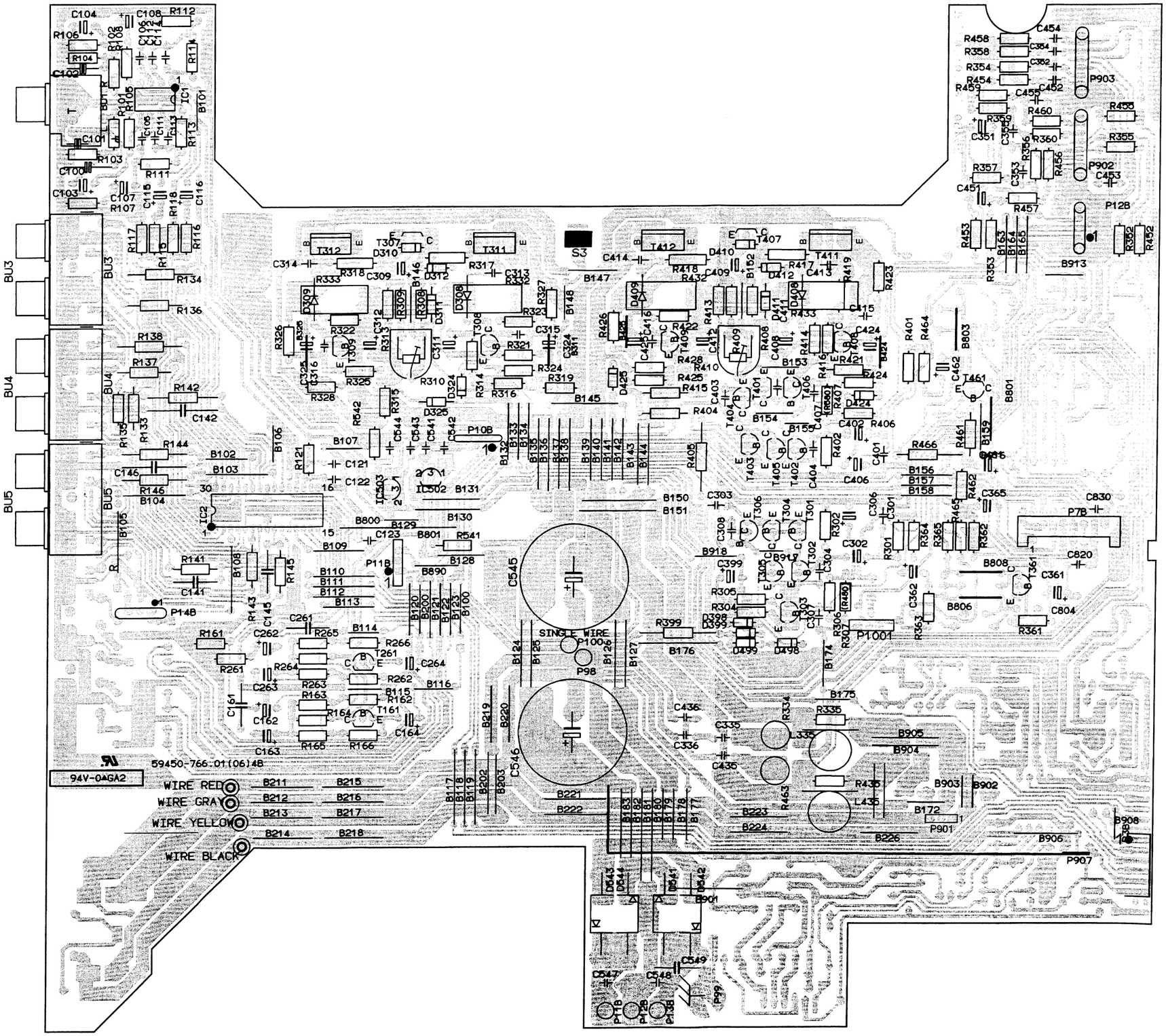


2.7 SCHEMATIC DIAGRAM (VERSIONS /02B/02G/05B/07B): AUDIO BOARD, VOLUME BOARD, POTENTIOMETER BOARD, LOUD SPEAKERS BOARD, SPEAKERS BOARD

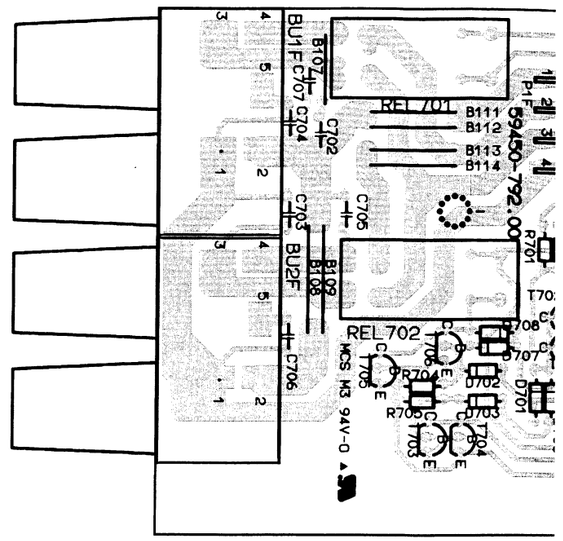



POTENTIOMETER BOARD
LOUD. SPEAKERS BD
SPEAKERS BOARD
VOLUME BOARD
AUDIO BOARD
FROM P2V VOLUME BD
FROM P1001 AUDIO BD
FROM P3C CONTROL BD
TO P3D POT. BD
FROM P4C CONTROL BD
FROM P0C CONTROL BD
TO P2, P3, P4 TRAFO BOARD
TO P3V VOLUME BD
SPEAKER 2 LEFT 4-16Ω
SPEAKER 1 LEFT 4-16Ω
SPEAKER 2 RIGHT 4-16Ω
SPEAKER 1 RIGHT 4-16Ω
+12V
SPEAKER 2
SPEAKER 1
REL702
REL701
2-SPEAKERS-1
(-37.2V)
(-38.4V)
+B (+38.4V)
-B (-38.4V)
WIRES
BLACK
RED
GREY
YELLOW

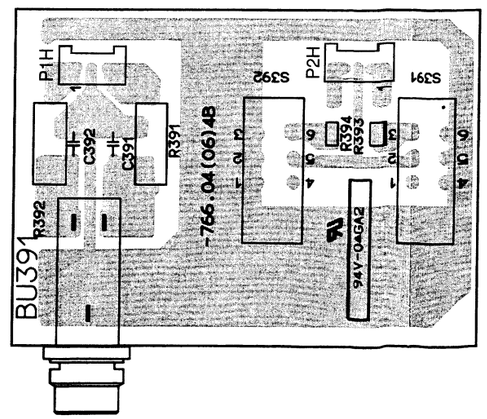
2.8.1 AUDIO PCB
(component side)



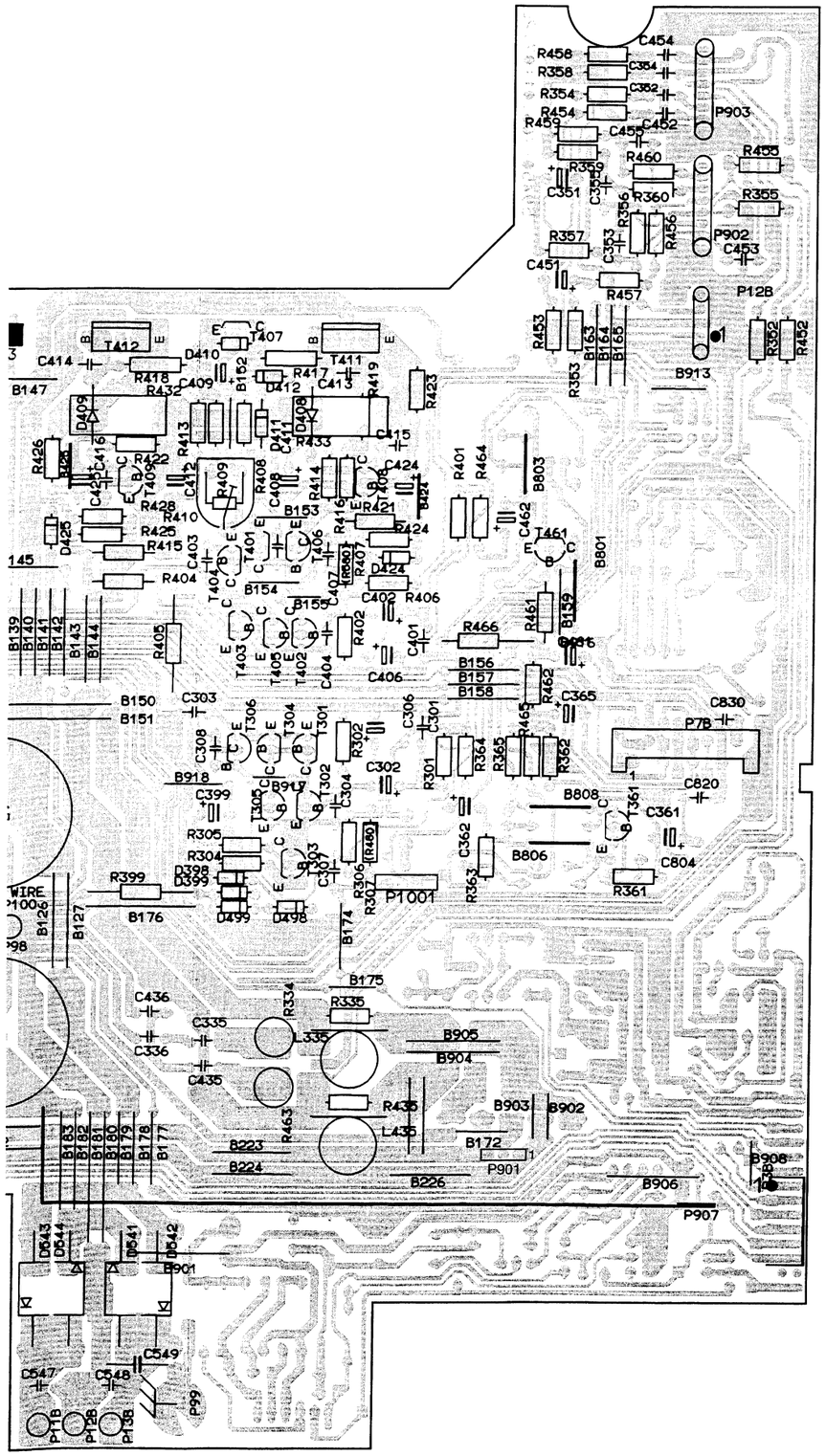
2.8.2 LOUD SPEAKERS PCB
(component side)

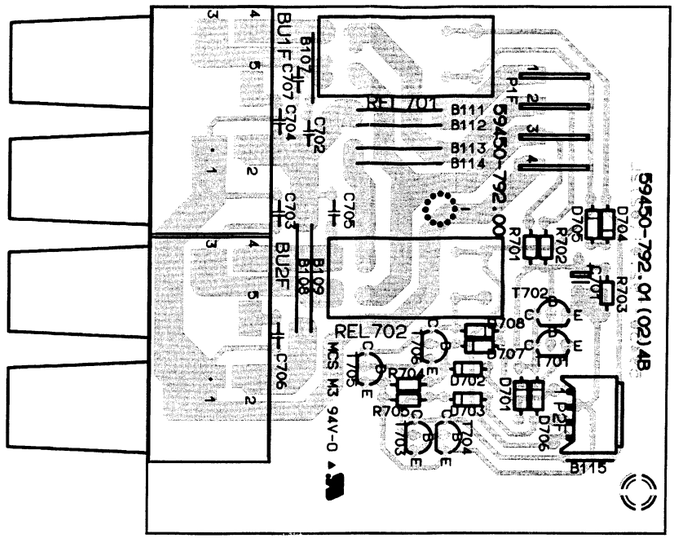


2.8.4 SPEAKERS PCB
(component side)

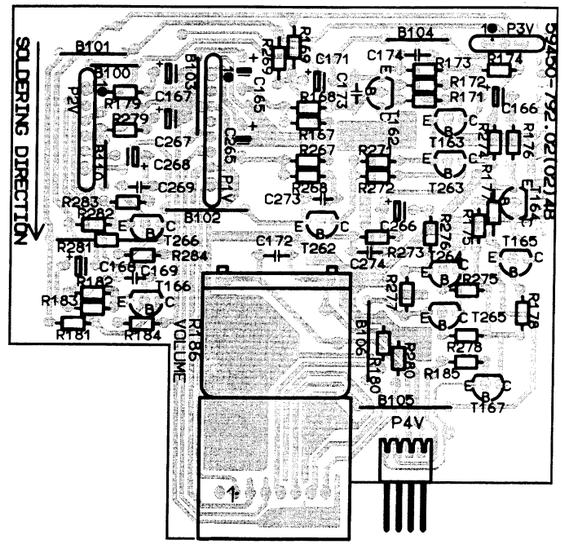


2.8.2 LOUD SPEAKERS PCB
(component side)

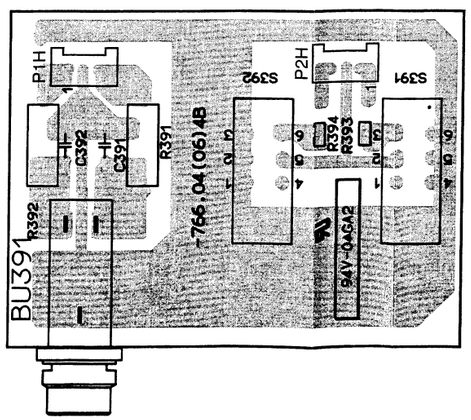




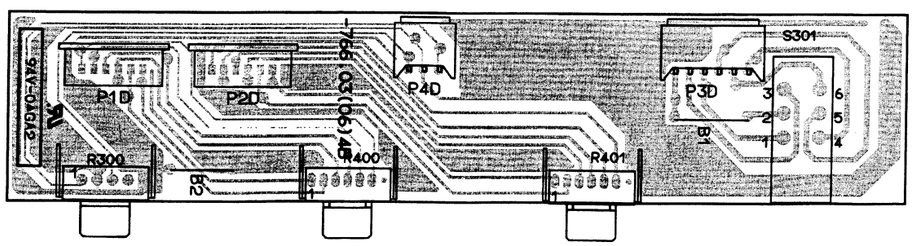
2.8.3 VOLUME PCB
(component side)



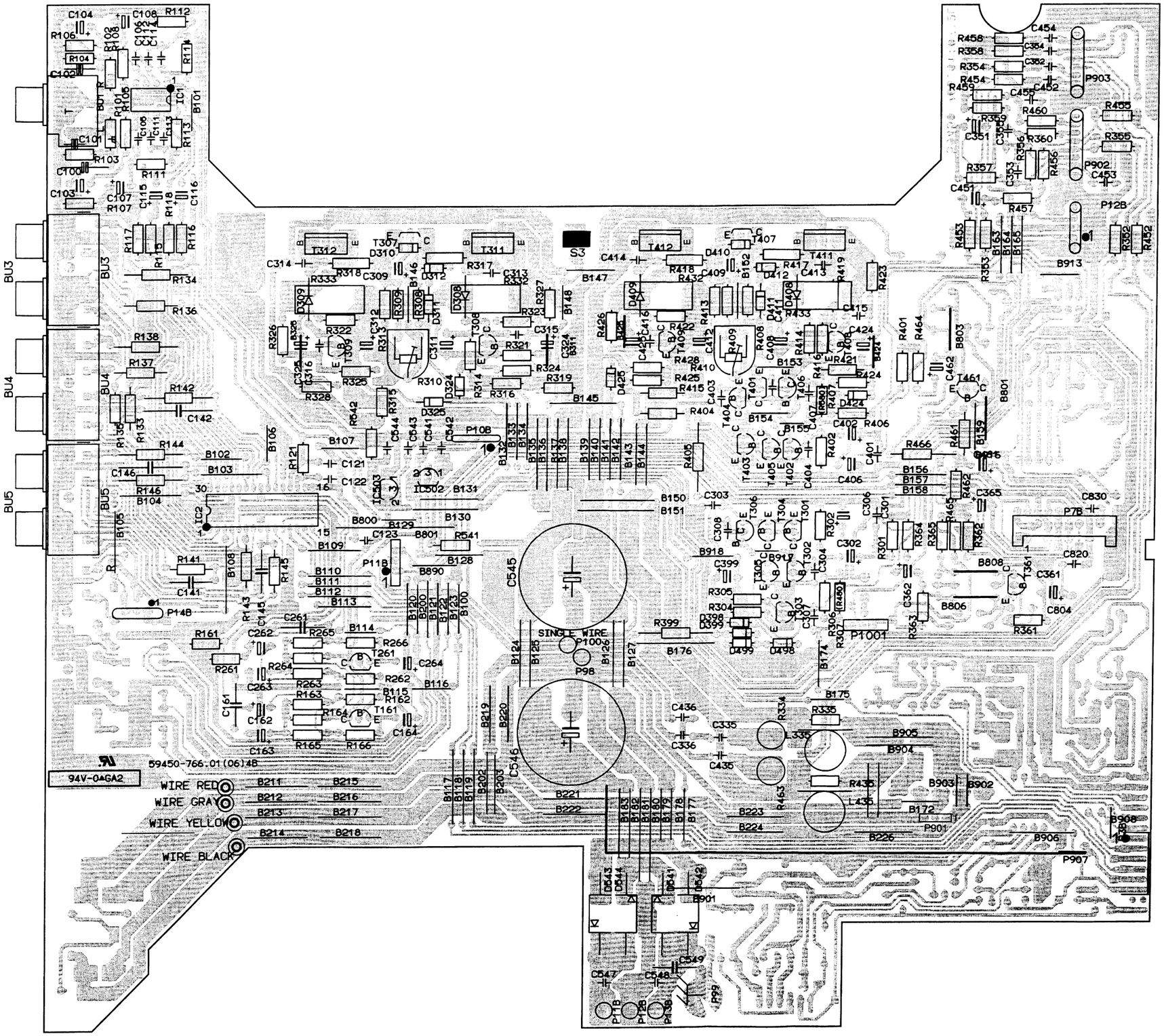
2.8.4 SPEAKERS PCB
(component side)



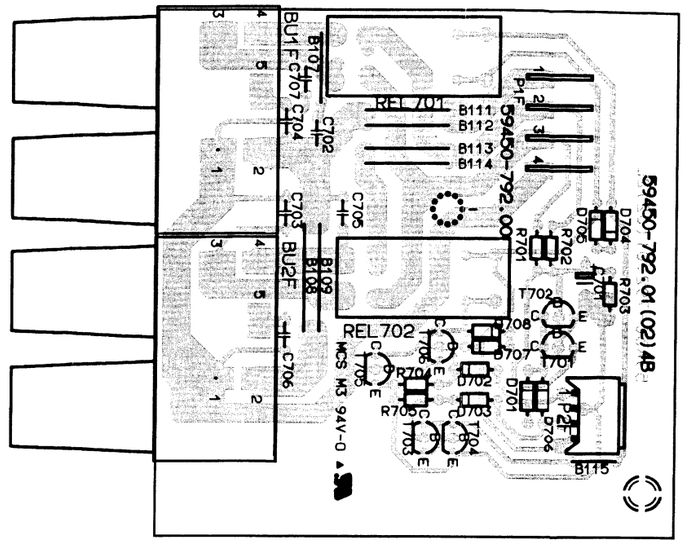
2.8.5 POTENTIOMETER PCB
(component side)



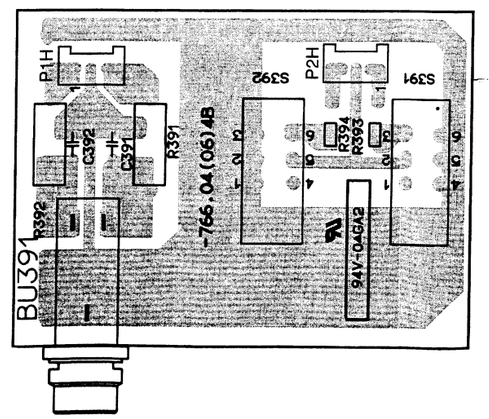
2.8.1 AUDIO PCB
(component side)



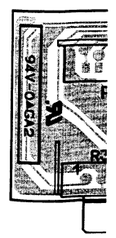
2.8.2 LOUD SPEAKERS PCB
(component side)

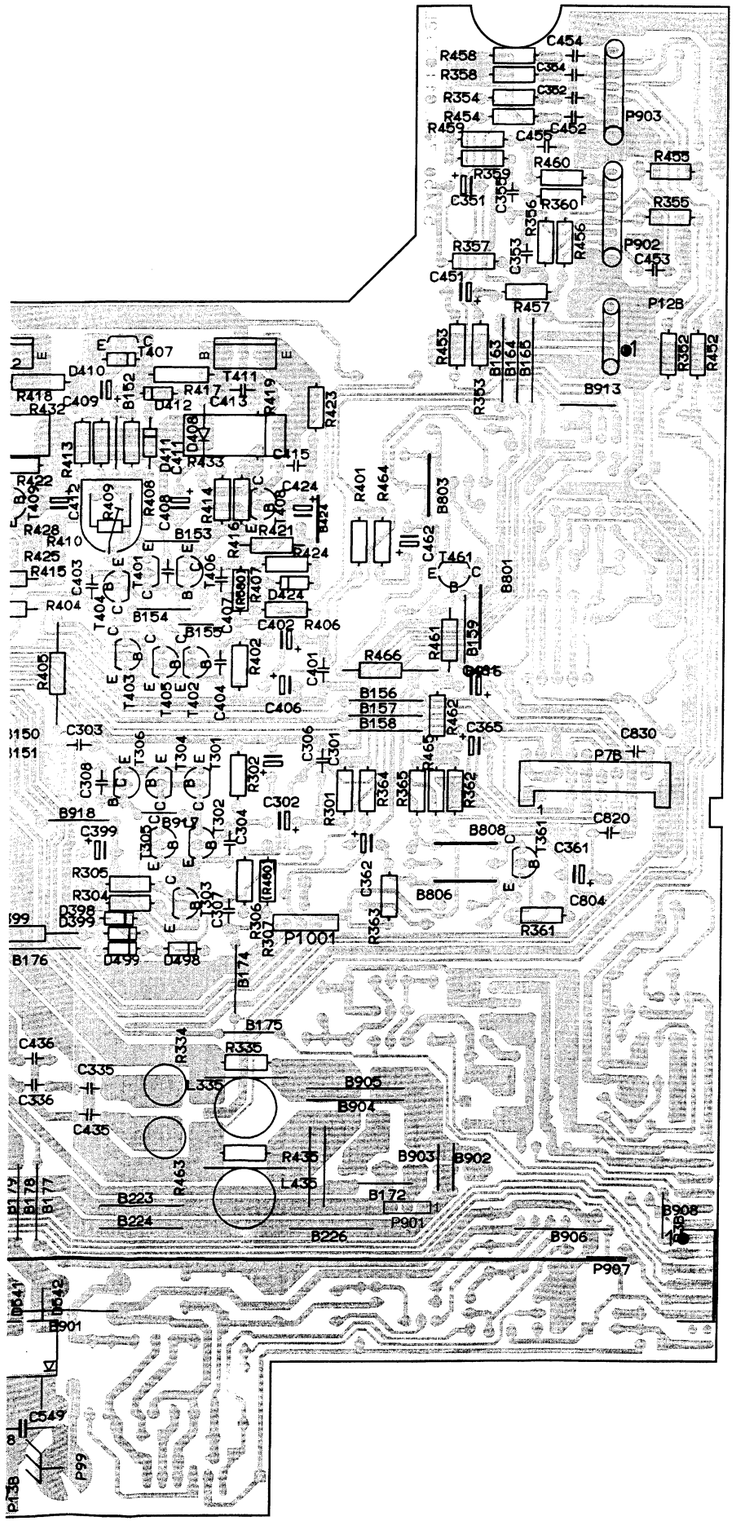


2.8.4 SPEAKERS PCB
(component side)

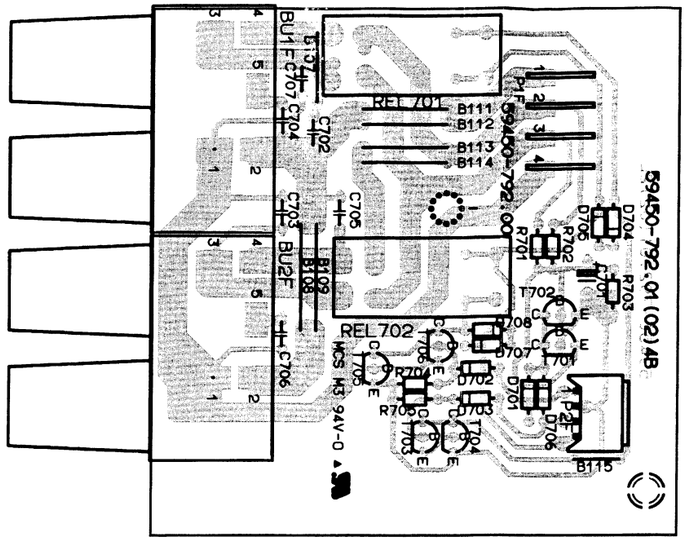


2.8.5 POT
(componen

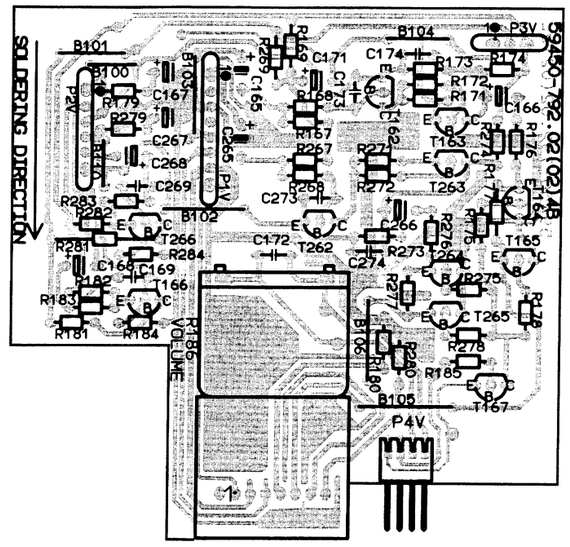




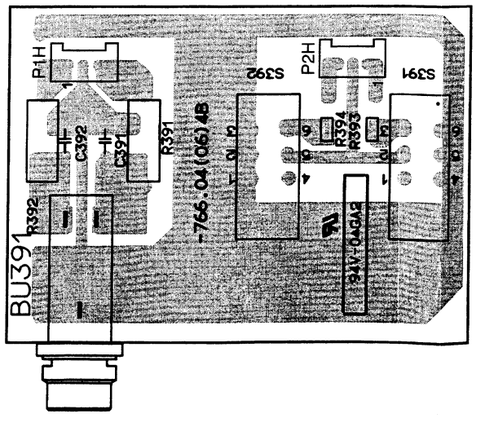
2.8.2 LOUD SPEAKERS PCB
(component side)



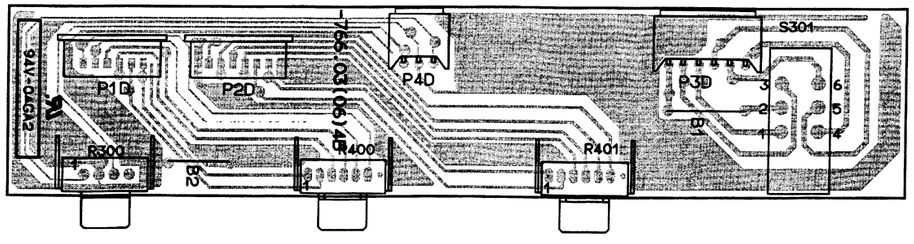
2.8.3 VOLUME PCB
(component side)



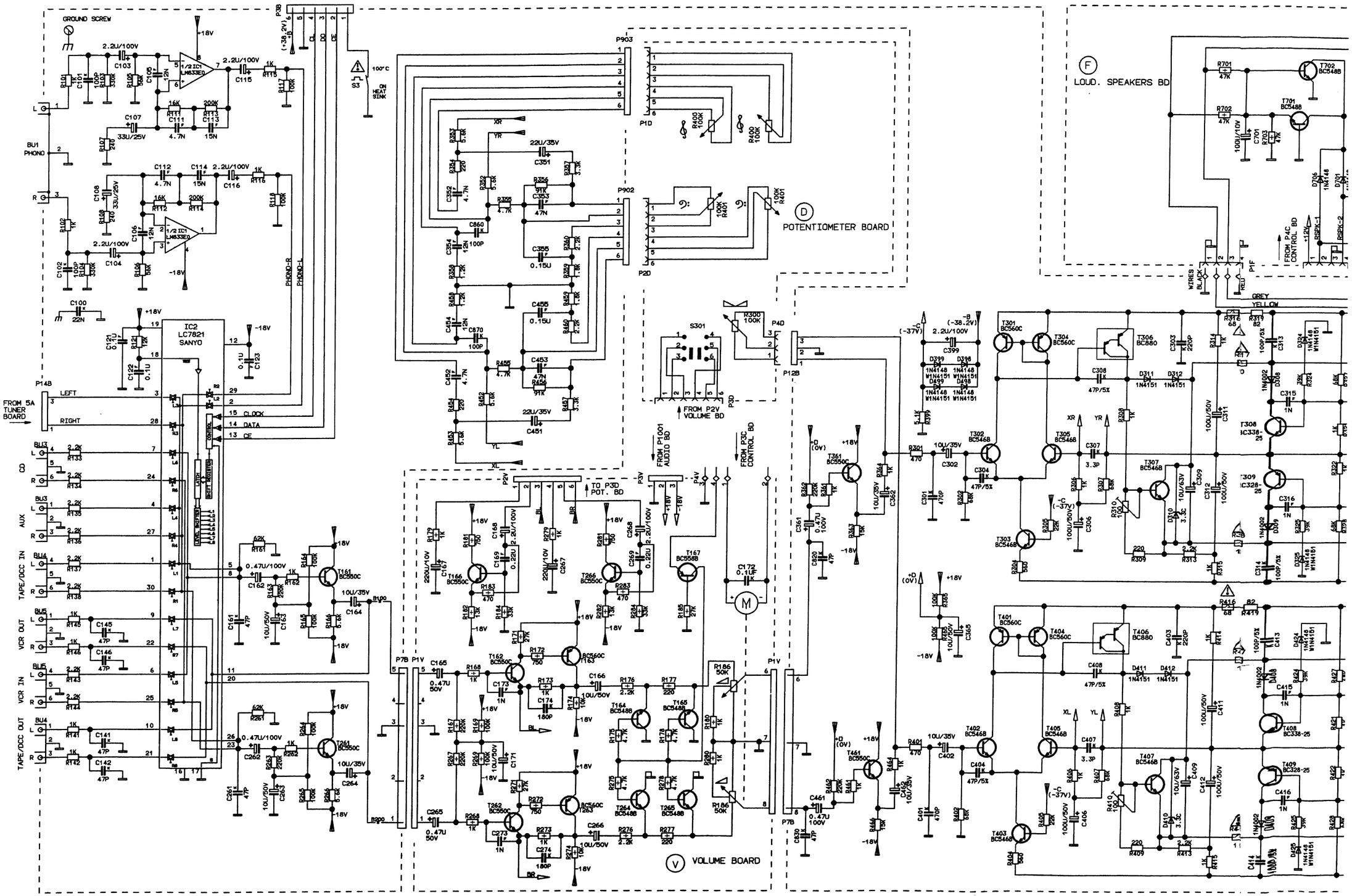
2.8.4 SPEAKERS PCB
(component side)



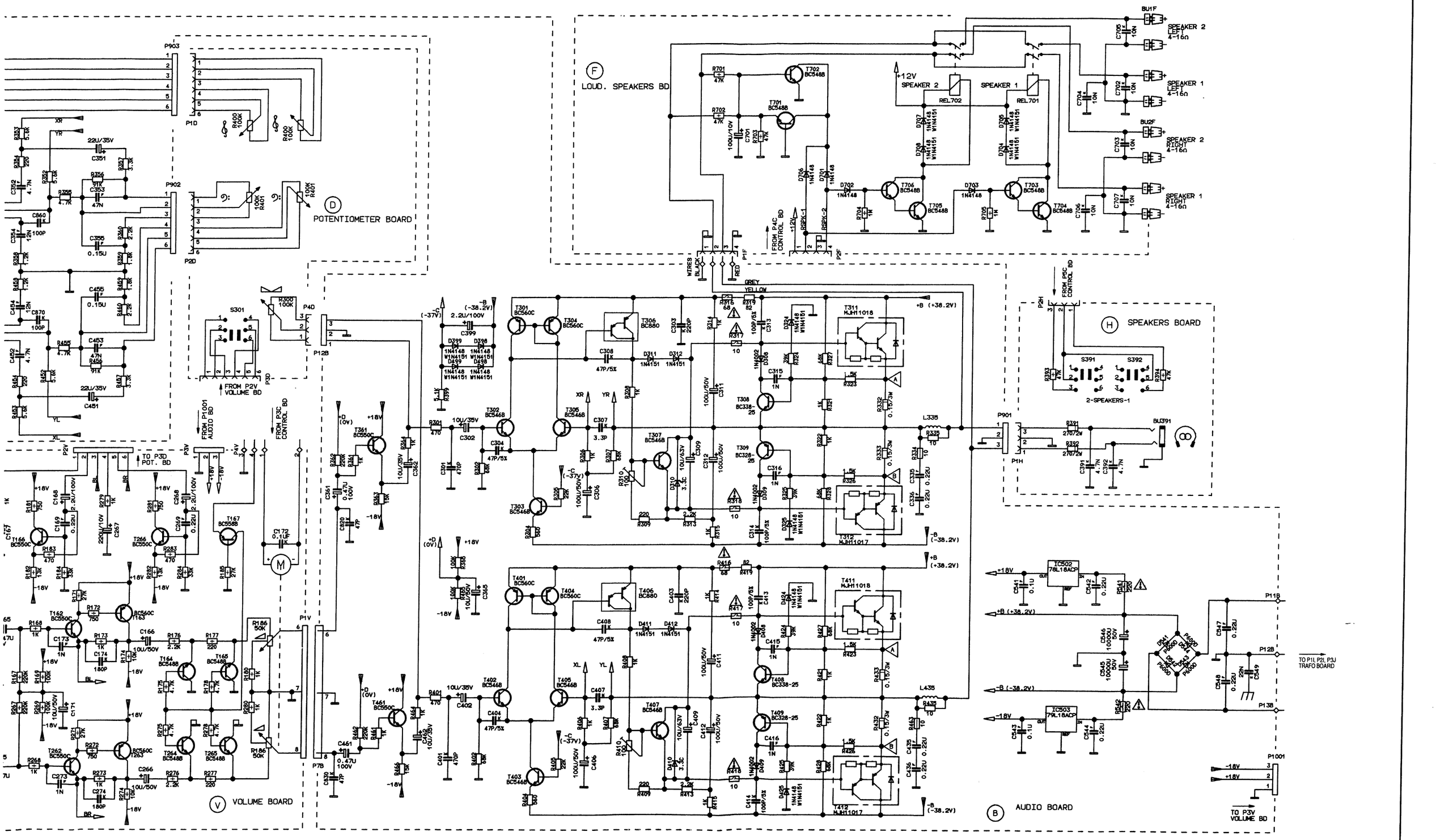
2.8.5 POTENTIOMETER PCB
(component side)



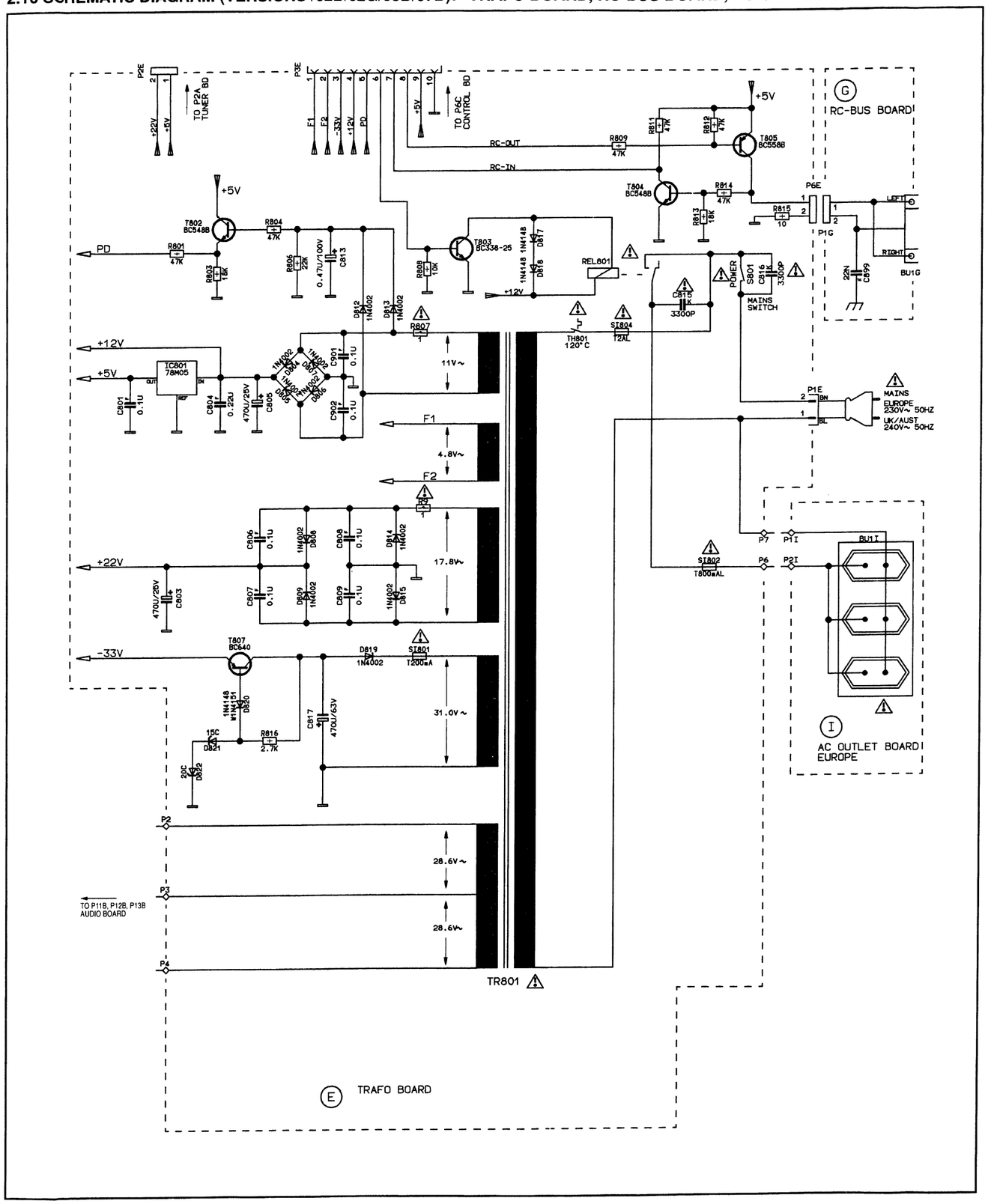
2.9 SCHEMATIC DIAGRAM (VERSIONS /01B/01G): AUDIO BOARD, VOLUME BOARD, POTENTIOMETER BOARD, LOUD SPEAKERS BOARD, SPEAKERS BOARD



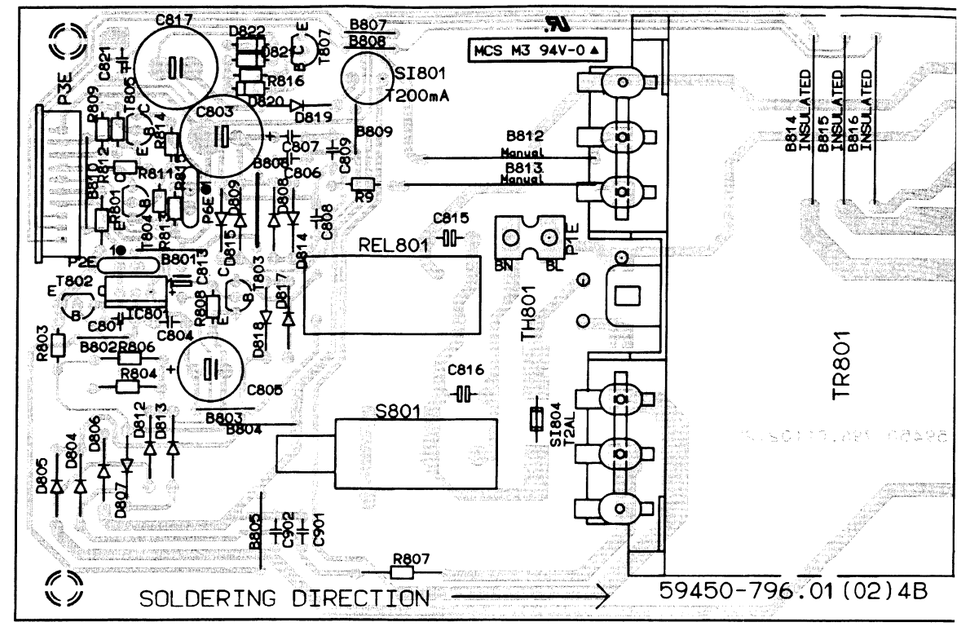
TENTIOMETER BOARD,
S BOARD



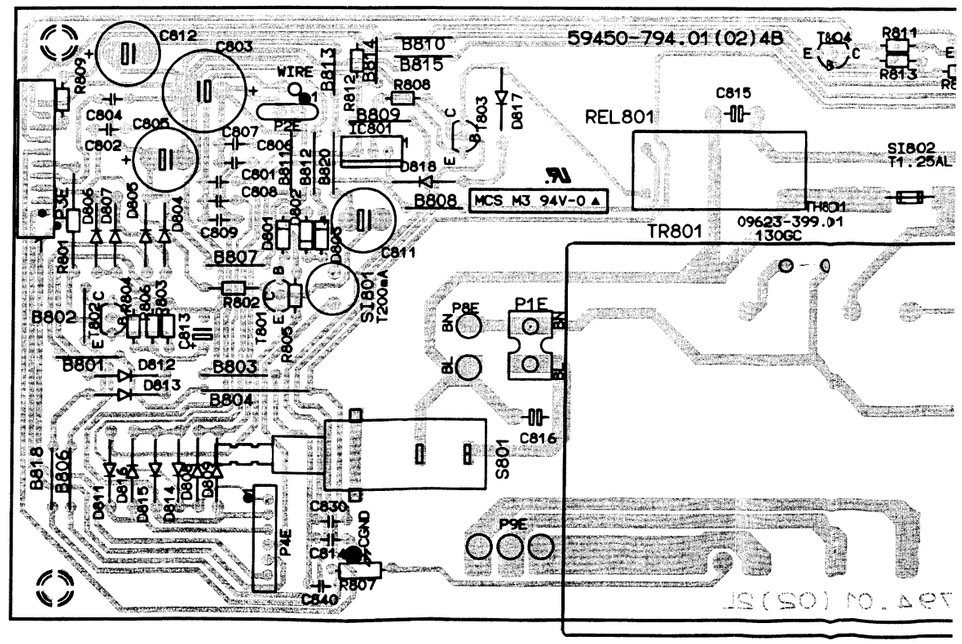
2.10 SCHEMATIC DIAGRAM (VERSIONS /02B/02G/05B/07B): TRAFO BOARD, RC-BUS BOARD, AC OUTLET BOARD



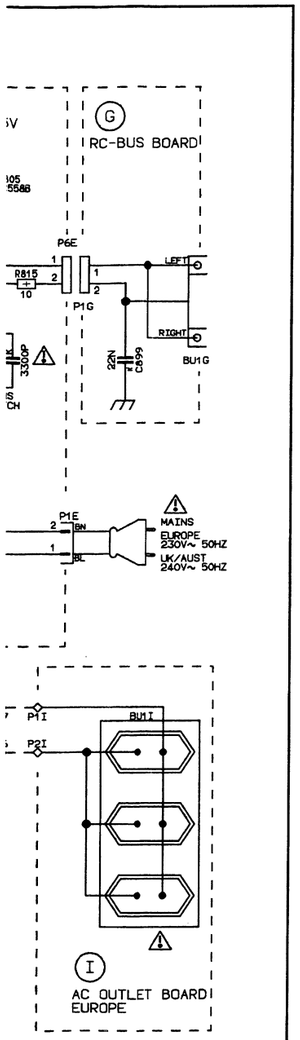
2.11.1 TRAFO PCB (VERSIONS /02B/02G)
(component side)



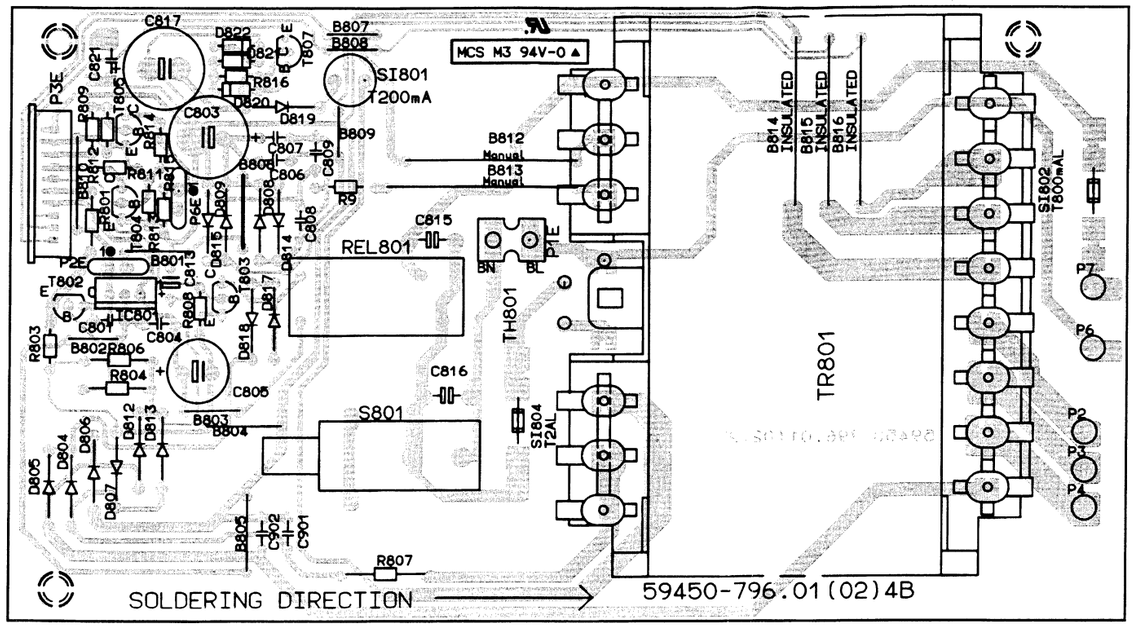
2.11.2 TRAFO PCB (VERSIONS /05B/07B)
(component side)



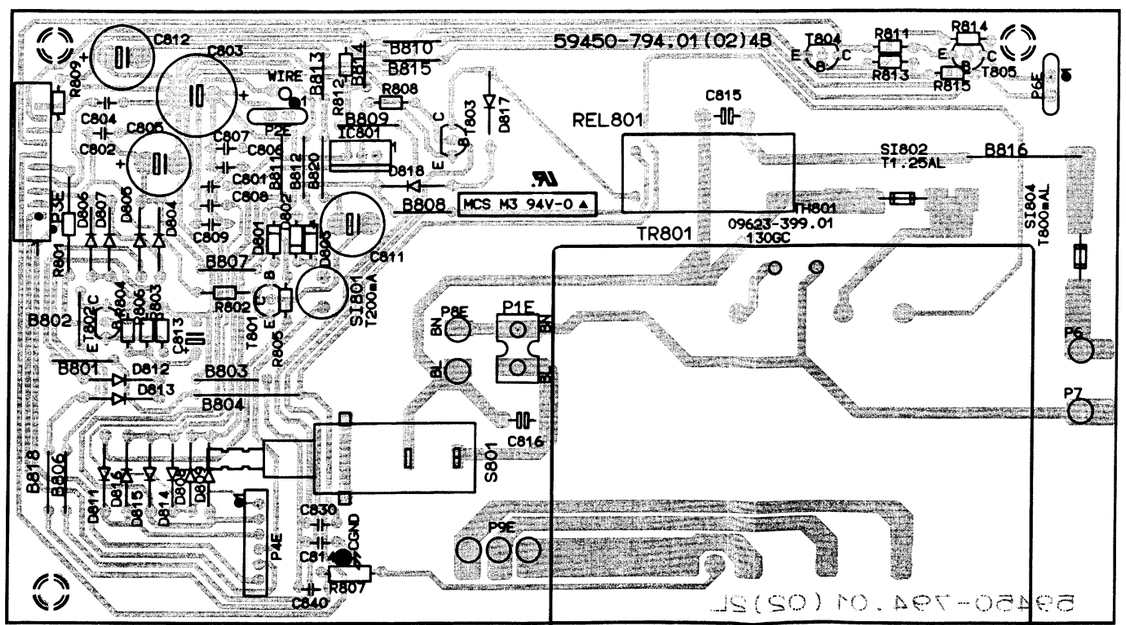
OUTLET BOARD



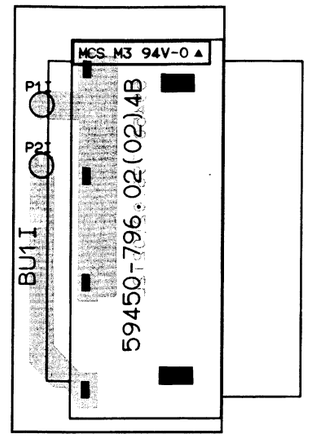
2.11.1 TRAFO PCB (VERSIONS /02B/02G)
(component side)



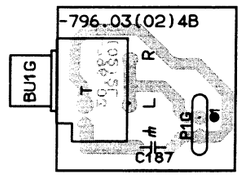
2.11.2 TRAFO PCB (VERSIONS /05B/07B)
(component side)



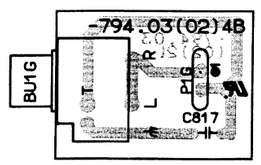
2.11.3 AC OUTLET PCB (VERSIONS /02B/02G)
(component side)



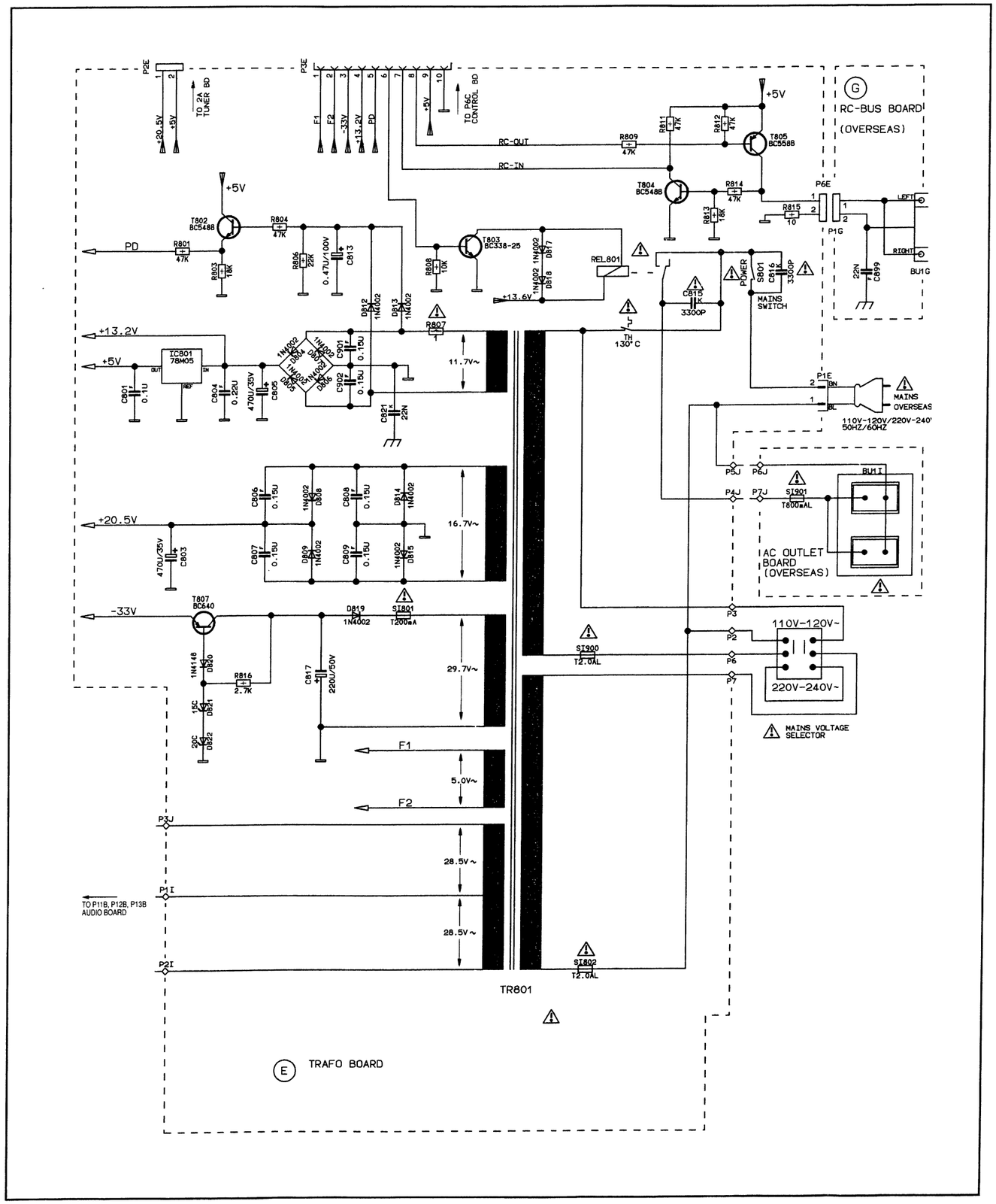
2.11.4 RC-BUS PCB (VERSIONS /02B/02G)
(component side)



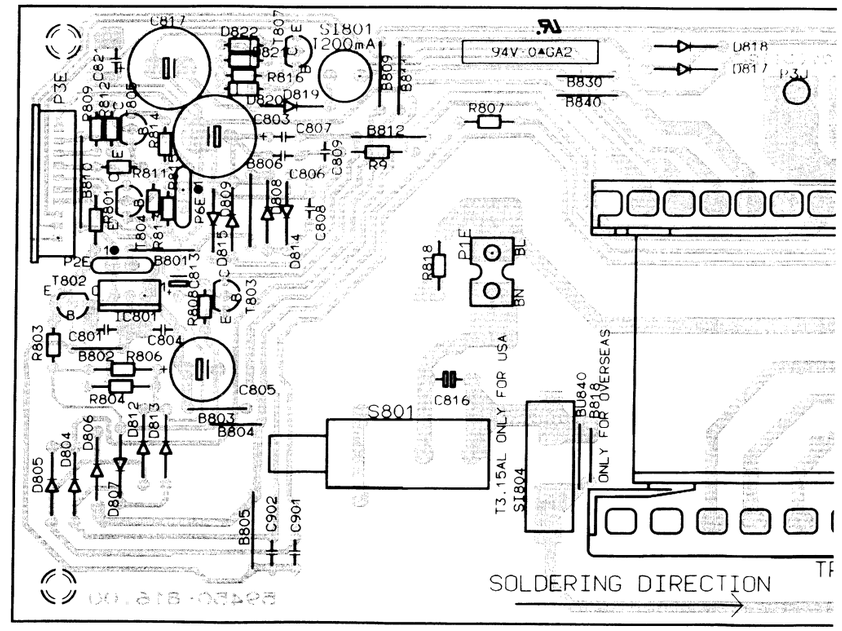
2.11.5 RC-BUS PCB (VERSIONS /05B/07B)
(component side)



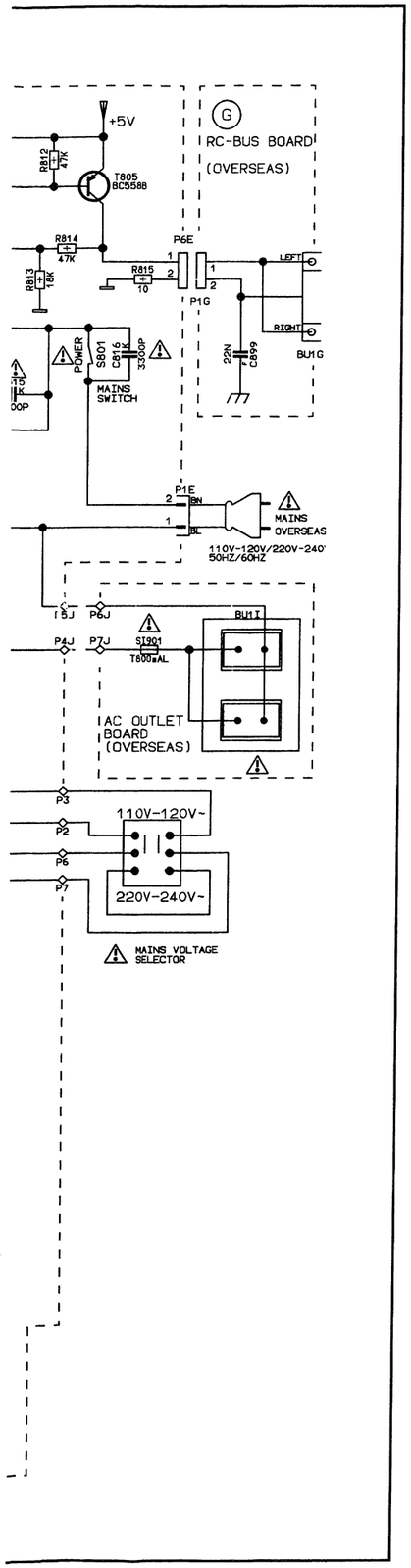
2.12 SCHEMATIC DIAGRAM (VERSIONS /01B/01G): TRAFO BOARD, RC-BUS BOARD, AC OUTLET BOARD



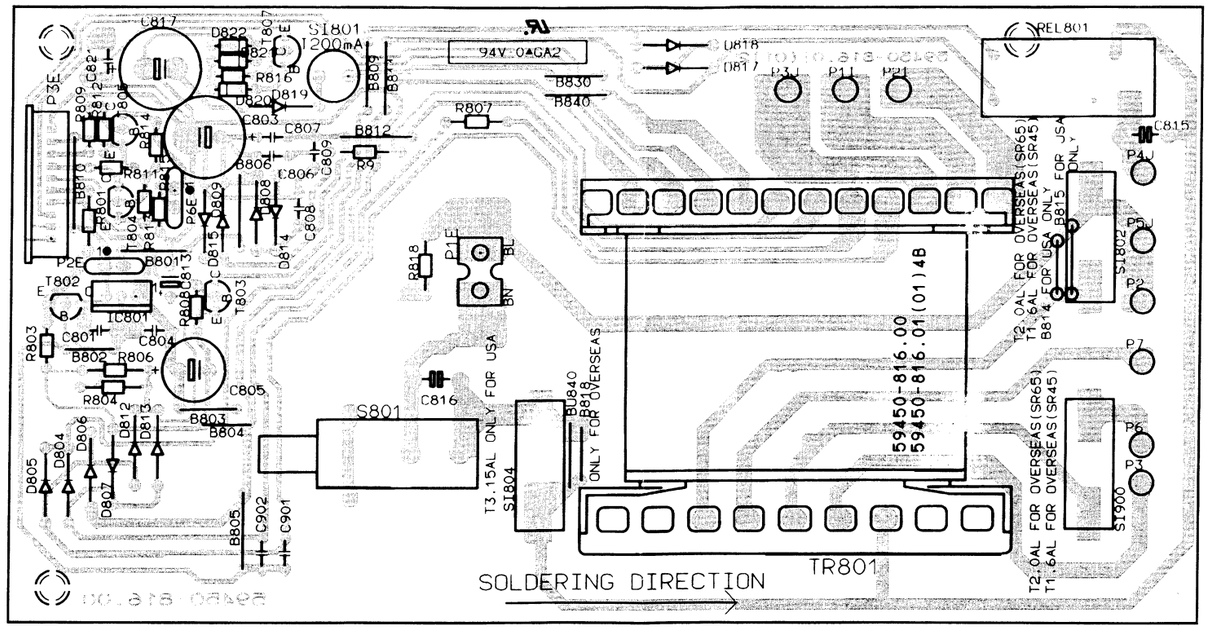
2.13.1 TRAFO PCB (VERSIONS /01B/01G)
(component side)



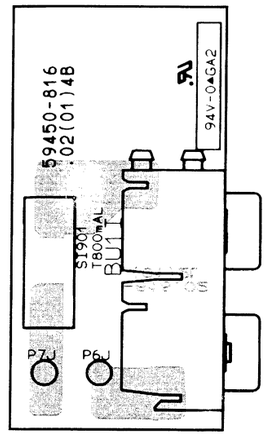
: OUTLET BOARD



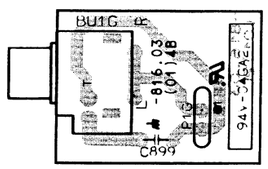
2.13.1 TRAFO PCB (VERSIONS /01B/01G)
(component side)



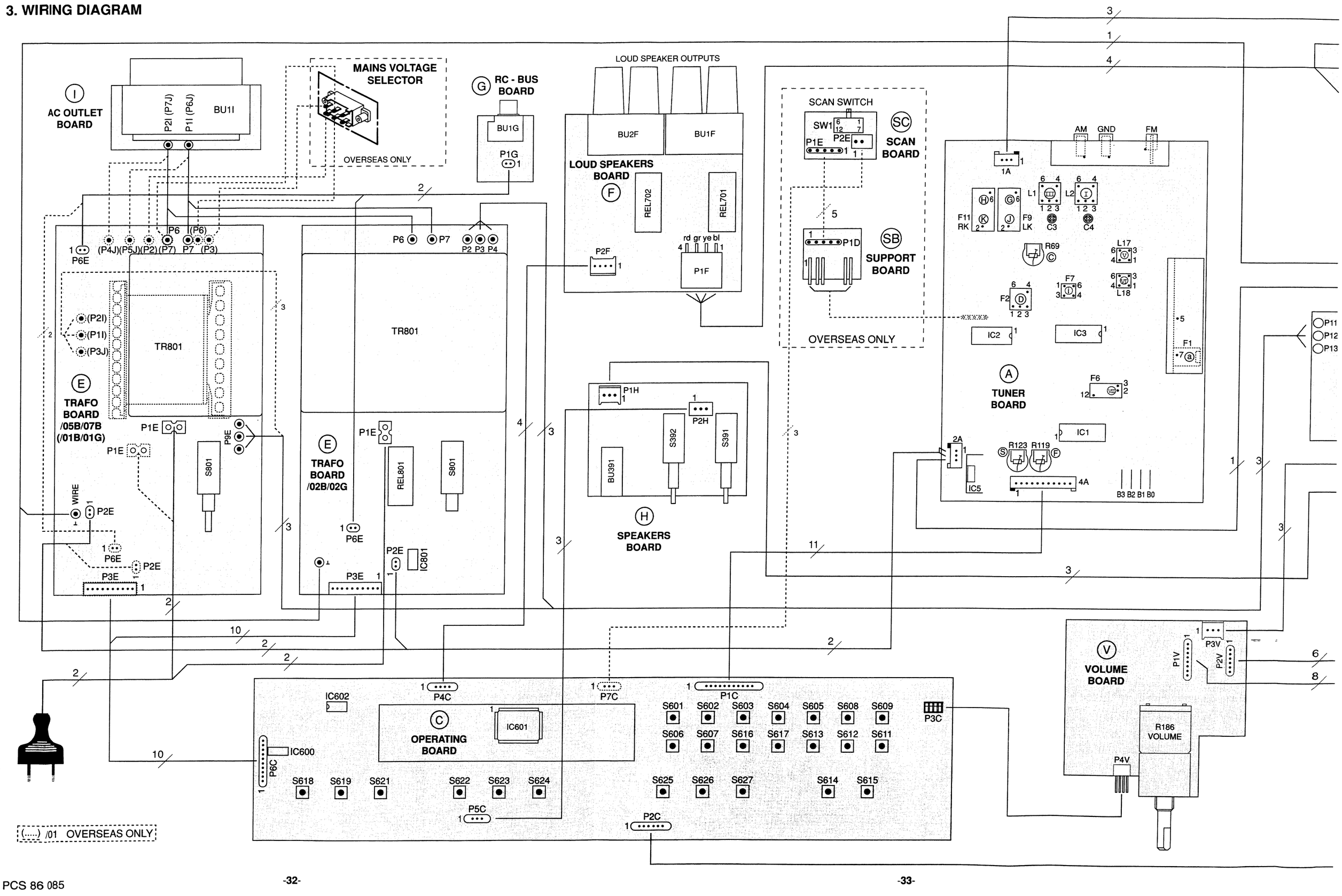
2.13.2 AC OUTLET PCB (VERSIONS /01B/01G)
(component side)

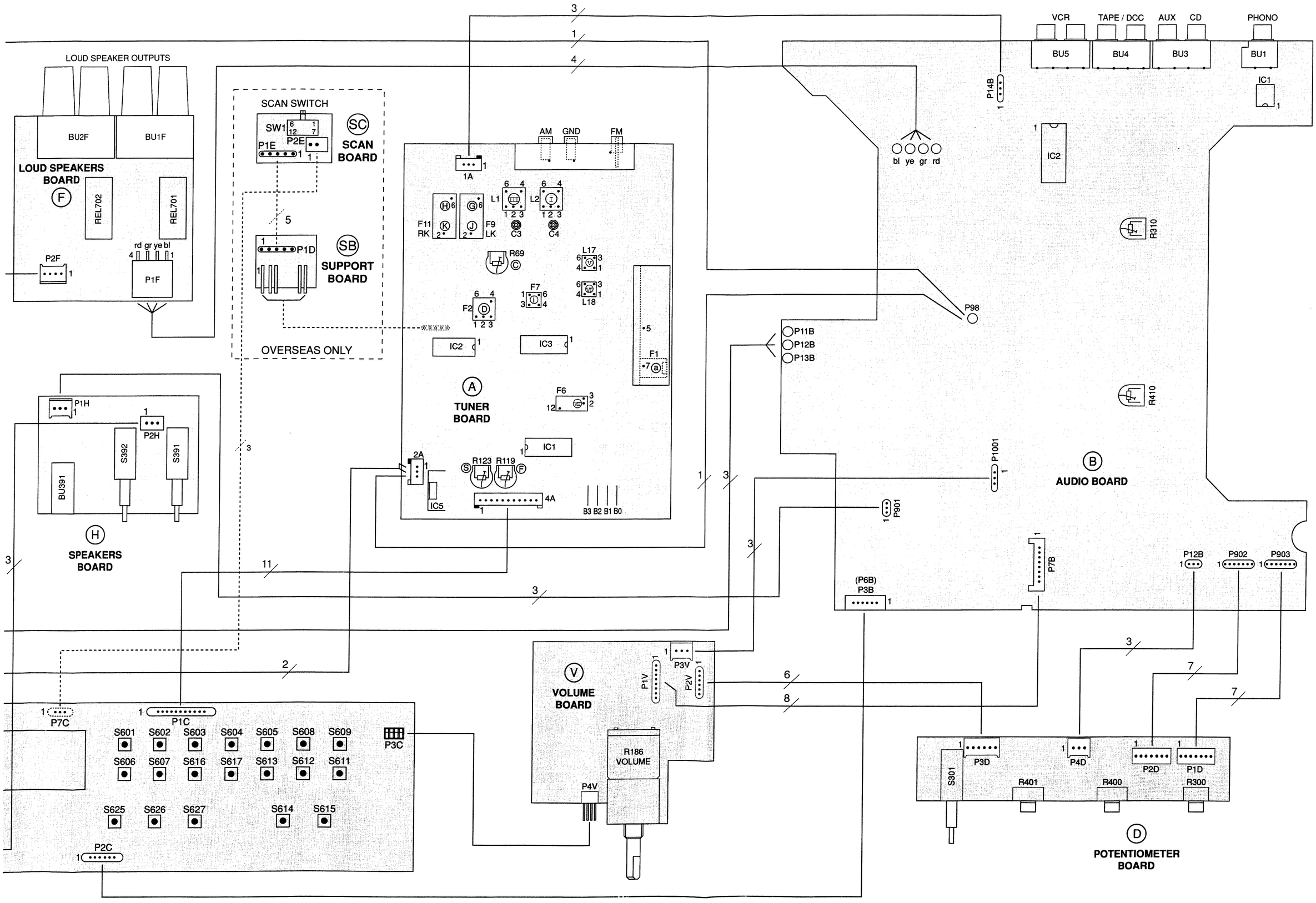


2.13.3 RC-BUS PCB (VERSIONS /01B/01G)
(component side)



3. WIRING DIAGRAM



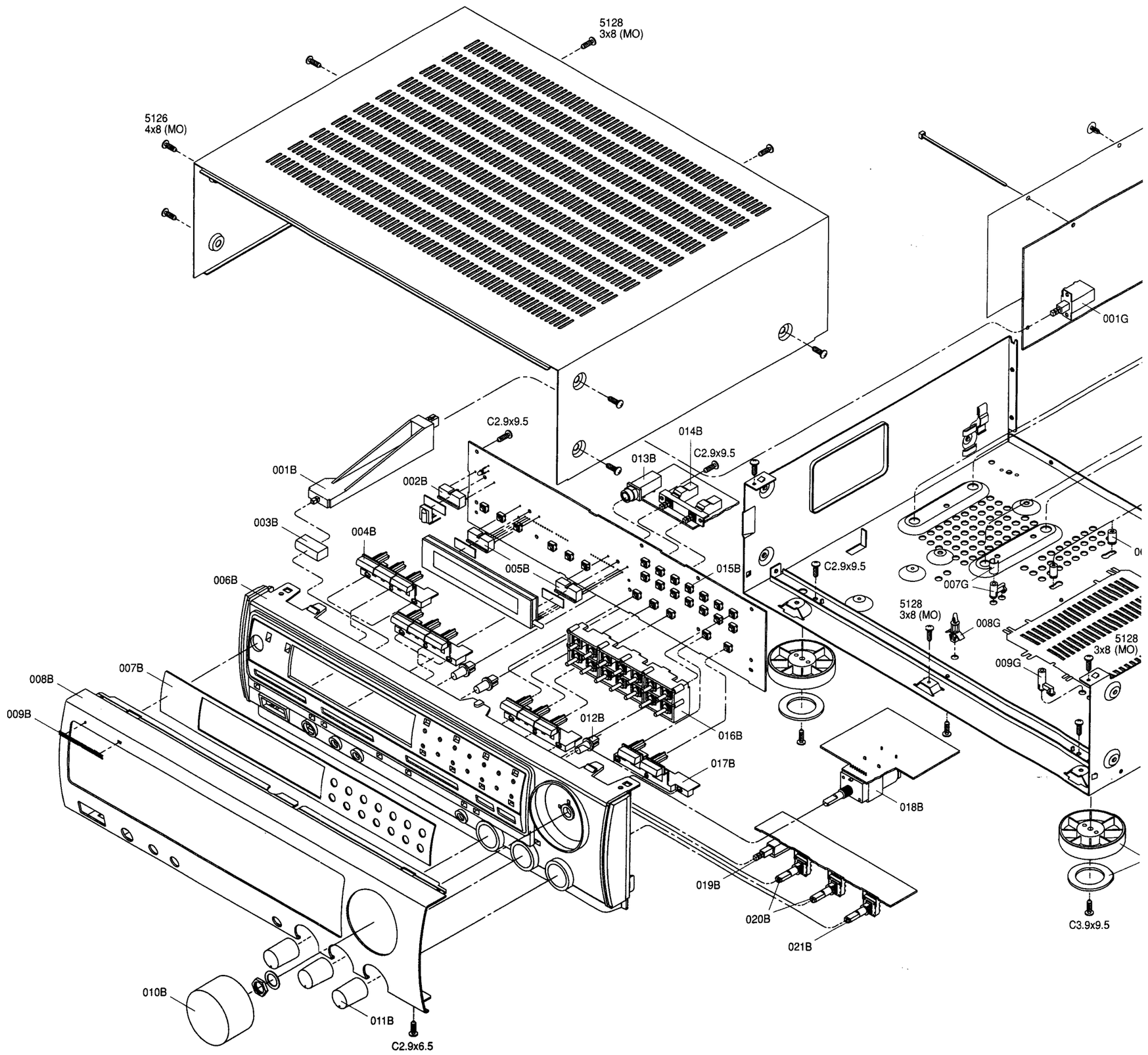


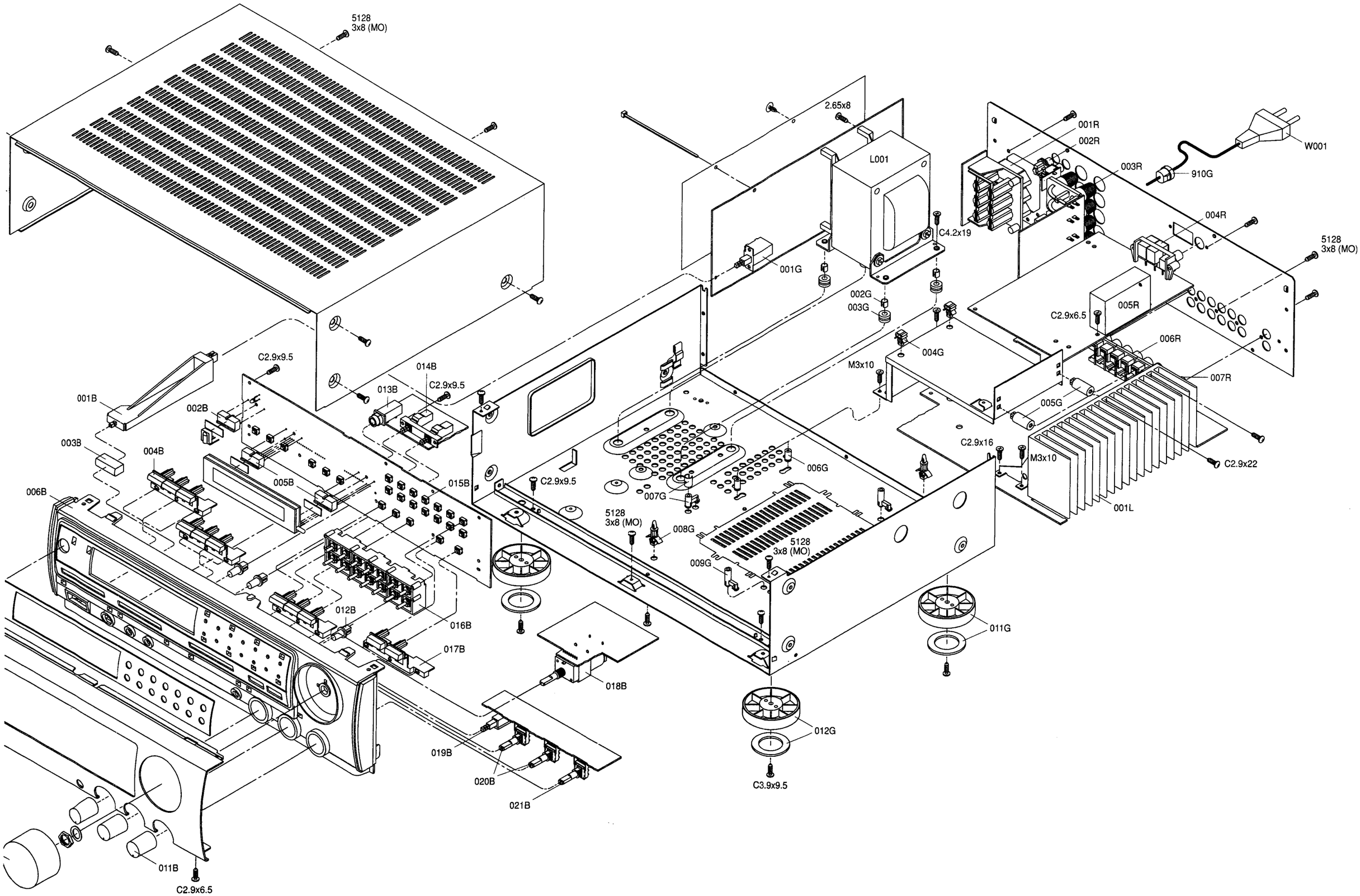
MARA-00655 / DRUCK 20

4. EXPLODED VIEW AND PARTS LIST

(VERS. :VERSION, U:U.S.A., F:JAPAN, K:FAR EAST, **:EUROPE)

POS. NO	VERS.COLOR	PART NO. (PH)	DESCRIPTION	PART NO. (MZ)
001B		482240421349	POWER LINK	QP40421349
003B	01B/02B/05B/07B	482241063889	POWER SWITCH KNOB BLK	QP41063889
003B	01G/02G	482241063931	POWER SWITCH KNOB GLD	QP41063931
004B		482241063893	FUNCTION BUTTON	QP41063893
006B	01B	482242651848	FRONT PANEL MOLD BLK	QP42651848
006B	02B/05B/07B	482242651858	FRONT PANEL MOLD BLK	QP42651858
006B	01G	482242651859	FRONT PANEL MOLD GLD	QP42651859
006B	02G	482242651867	FRONT PANEL MOLD GLD	QP42651867
007B	01B/01G	482245062515	WINDOW	QP45062515
007B	02B/05B/07B/02B	482245062532	WINDOW	QP45062532
008B	01B	482242651849	FRONT PANEL ALU. BLK	QP42651849
008B	02B/05B/07B	482242651865	FRONT PANEL ALU. BLK	QP42651865
008B	01G	482242651861	FRONT PANEL ALU. GLD	QP42651861
008B	02G	482242651866	FRONT PANEL ALU. GLD	QP42651866
009B	01B/02B/05B/07B	482245911172	MARANTZ BADGE BLK	185J251010
009B	01G/02G	482245911173	MARANTZ BADGE GLD	185J251110
010B	01B/02B/05B/07B	482241341923	VOLUME KNOB BLK	QP41341923
010B	01G	482241341925	VOLUME KNOB GLD	QP41341925
011B	01B/02B/05B/07B	482241331868	TONE/BALANCE KNOB BL	QP41331868
011B	01G	482241331875	TONE/BALANCE KNOB GL	QP41331875
012B		482241063895	BASS-EQ BUTTON	QP41063895
013B		482226731463	HEAD PHONE JACK	QP26731463
014B	01B/05B/07B/01G	482227613634	PUSH SWITCH	QP27613634
015B		482241062446	TACT SWITCH	QP41062446
016B		482241063892	14 KEY BUTTON	QP41063892
017B		482241063894	TUNE KEY	QP41063894
⚠ 001G		482227613636	MAINS SWITCH	QP27613636
011G		482246242048	FOOT (REAR)	183J057110
012G		482246242045	FOOT (FRONT)	183J057010
001R	01B/01G	482226731962	MAINS SOCKET	QP26731962
⚠ 001R	02B/02G		MAINS OUTLET	
002R		482226531305	RCA PIN JACK (RC-5)	QP26531305
003R		482229061254	SPEAKER TERMINAL	QP29061254
004R		482226710296	ANTENNA TERMINAL	QP26710296
005R		482221010531	TUNER PACK	QP21010531
006R		482226741153	RCA PIN JACK (4)	QP26741153
007R		482226731834	RCA PIN JACK (2)	QP26731834
001T		482273622519	USER MANUAL	QP73622519
⚠ L001	01B/01G	482214621837	MAINS TRANSFORMER	QP14621837
⚠ L001	02B/02G	482214621846	MAINS TRANSFORMER	QP14621846
⚠ L001	05B/07B	482214621853	MAINS TRANSFORMER	QP14621853
MVS1	01B/01G	482227721807	SLIDE SWITCH	QP27721807
SW1	01B/01G	482227613635	SCAN SWITCH	QP27613635
⚠ W001	01B/01G	482232111135	MAINS CORD	QP32111135
⚠ W001	02B/05B/07B/02G	482232122917	MAINS CORD	QP32122917
Z001		482221810595	REMOTE COMMANDER	QP21810595




5128
3x8 (MO)
2.65x8
L001
001R
002R
003R
W001
910G
004R
C4.2x19
001G
002G
003G
004G
005R
C2.9x6.5
006R
007R
M3x10
005G
C2.9x16
C2.9x22
001L
006G
007G
008G
009G
011G
012G
C3.9x9.5
C2.9x9.5
001B
002B
003B
004B
005B
006B
011B
012B
013B
014B
015B
016B
017B
018B
019B
020B
021B

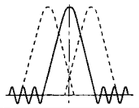
5. ALIGNMENT PROCEDURES

5.1 FM Alignment Procedures

(Function switch at "FM" position)

Note: The frontend is a completely preadjusted module. Only the IF-filter must be adjusted to the IF amplifier.
The values of the tuning voltages are:
87.5MHz = typ. 1.6V min 1.3V
108MHz = typ. 8.0V max 9V

• FM IF Alignment

Step	Signal Source Connection	Signal Frequency	Indicator Connection	Adjust
1	Connect an FM sweep generator to FM aerial socket. U_{RF} = approx. 100µV / 75Ω	98MHz	Connect an oscilloscope to measuring point ⟨B⟩	With IF filter F1 (a) adjust for maximum level and symmetrical position. 

• FM Demodulator Alignment

Step	Signal Source Connection	Signal Frequency	Indicator Connection	Adjust
1	Connect an FM generator to FM aerial socket. U_{RF} = 1mV / 75Ω Δf = ±40kHz	98MHz	Connect a distortion analyzer to measuring point ⟨R⟩ and ⟨L⟩	With filter F7 (i) adjust for minimum distortion. (typ. ≤0.2%)

• FM Field Strength IND - Search Stop Alignment

Step	Signal Source Connection	Signal Frequency	Indicator Connection	Adjust
1	Connect an FM generator to FM aerial socket. U_{RF} = 1mV / 75Ω	98MHz	DC-VM to measuring point ⟨F⟩	With R119 (F) set to 1.5V +0.05V.
2	Connect an FM generator to FM aerial socket. U_{RF} = 15µV / 75Ω	98MHz	DC-VM to measuring point ⟨G⟩	With R123 (S) set to 0.7V +0.05V.

• Multiplex Alignment

Step	Signal Source Connection	Signal Frequency	Indicator Connection	Adjust
1	Connect a stereo encoder to FM aerial socket.	106MHz $L_{mod.}$ = 1kHz	Connect AC-VM to measuring point ⟨R⟩	With R69 (C) adjust for maximum and symmetrical crosstalk attenuation.
2		106MHz $R_{mod.}$ = 1kHz	Connect AC-VM to measuring point ⟨L⟩	
3	Connect an FM generator to FM aerial socket.	98MHz $f_{mod.}$ = 38kHz	Connect AC-VM to measuring point ⟨R⟩ and ⟨L⟩	With F9 (J), F11 (K) adjust for minimum level.
4		98MHz $f_{mod.}$ = 19kHz		With F9 (G), F11 (H) adjust for minimum level.

• Adjacent Channel Filter Alignment

Step	Signal Source Connection	Signal Frequency	Indicator Connection	Adjust
1	Connect an AF generator to the input of F2 (Pin 2). U_{AF} = approx. 100mV	114 kHz	Connect AC-VM to the output of F2 (Pin 4).	With F2 (D) adjust for minimum level.

5.2 AM Alignment Procedures

(Function switch at "AM" position)

• MW/LW Oscillator Alignment

Step	Signal Source Connection	Signal Frequency	Indicator Connection	Adjust
1		531kHz (MW)	Connect DC-VM to measuring point ⟨E⟩	With L18 (VI) set the tuning voltage to 1.1V.
2		153kHz (LW)		With L17 (V) set the tuning voltage to 1.8V.

• MW RF IF Alignment

Step	Signal Source Connection	Signal Frequency	Indicator Connection	Adjust
1	Feed in an AM generator signal via a frame aerial. m = 30%, $f_{mod.}$ = 1kHz	1449kHz	Connect AC-VM to measuring point ⟨R⟩ and ⟨L⟩	With C3 (IV) and the IF Filter F6 (VII) set UAF to maximum level.
2		558kHz		With L1 (III) set U_{AF} to maximum level.
3	Repeat the adjustment of C3 and L1 until sensitivity is maximized, end with C3.			

• LW RF IF Alignment

Step	Signal Source Connection	Signal Frequency	Indicator Connection	Adjust
1	Feed in an AM generator signal via a frame aerial. m = 30%, $f_{mod.}$ = 1kHz	261kHz	Connect AC-VM to measuring point ⟨R⟩ and ⟨L⟩	With C4 (II) set U_{AF} to maximum level.
2		162kHz		With L2 (I) set U_{AF} to maximum level.
3	Repeat steps 1 and 2 until sensitivity is maximized, end with C4.			

5.3 Amplifier Alignment Procedures

• Quiescent Current Alignment

Step	Signal Source Connection	Volume	Indicator Connection	Adjust
1	No input signal. Turn on the set for at least 2 minutes.	min.	Connect DC-VM to measuring point left channel ⟨A⟩↔⟨B⟩	With R310 set the voltage to 5mV ±0.2mV.
2			Connect DC-VM to measuring point right channel ⟨A⟩↔⟨B⟩	With R410 set the voltage to 5mV ±0.2mV.

• FM IF offset

The ceramic resonators have different intermediate frequencies as a result of tolerances. Dependent on the IF, a jumper has to be closed or a jumper has to be opened. B0 - B3 (see table).
The resonators have been provided with a colour code.

When replacing one of the ceramic resonators, take care that the colours codes of all resonators are the same.

⟨⟩◁ Measuring points

◯ Trimming point

	Jumper				
IF (MHz)	B 3	B 2	B 1	B 0	Filter color
10.6500	0	1	0	0	Black
10.6750	0	1	1	0	Blue
10.7000	1	0	0	0	Red
10.7250	1	0	1	0	Orange
10.7500	1	1	0	0	White

0 = jumper open 1 = jumper closed

5.2 AM Alignment Procedures

(Function switch at "AM" position)

• MW/LW Oscillator Alignment

Step	Signal Source Connection	Signal Frequency	Indicator Connection	Adjust
1		531kHz (MW)	Connect DC-VM to measuring point ⟨E⟩	With L18 (VI) set the tuning voltage to 1.1V.
2		153kHz (LW)		With L17 (V) set the tuning voltage to 1.8V.

• MW RF IF Alignment

Step	Signal Source Connection	Signal Frequency	Indicator Connection	Adjust
1	Feed in an AM generator signal via a frame aerial. m = 30%, $f_{mod.}$ = 1kHz	1449kHz	Connect AC-VM to measuring point ⟨R⟩ and ⟨L⟩	With C3 (IV) and the IF Filter F6 (VII) set UAF to maximum level.
2		558kHz		With L1 (III) set U_{AF} to maximum level.
3	Repeat the adjustment of C3 and L1 until sensitivity is maximized, end with C3.			

• LW RF IF Alignment

Step	Signal Source Connection	Signal Frequency	Indicator Connection	Adjust
1	Feed in an AM generator signal via a frame aerial. m = 30%, $f_{mod.}$ = 1kHz	261kHz	Connect AC-VM to measuring point ⟨R⟩ and ⟨L⟩	With C4 (II) set U_{AF} to maximum level.
2		162kHz		With L2 (I) set U_{AF} to maximum level.
3	Repeat steps 1 and 2 until sensitivity is maximized, end with C4.			

5.3 Amplifier Alignment Procedures

• Quiescent Current Alignment

Step	Signal Source Connection	Volume	Indicator Connection	Adjust
1	No input signal. Turn on the set for at least 2 minutes.	min.	Connect DC-VM to measuring point left channel ⟨A⟩↔⟨B⟩	With R310 set the voltage to 5mV ±0.2mV.
2			Connect DC-VM to measuring point right channel ⟨A⟩↔⟨B⟩	With R410 set the voltage to 5mV ±0.2mV.

• FM IF offset

The ceramic resonators have different intermediate frequencies as a result of tolerances. Dependent on the IF, a jumper has to be closed or a jumper has to be opened. B0 - B3 (see table).
The resonators have been provided with a colour code.

When replacing one of the ceramic resonators, take care that the colours codes of all resonators are the same.

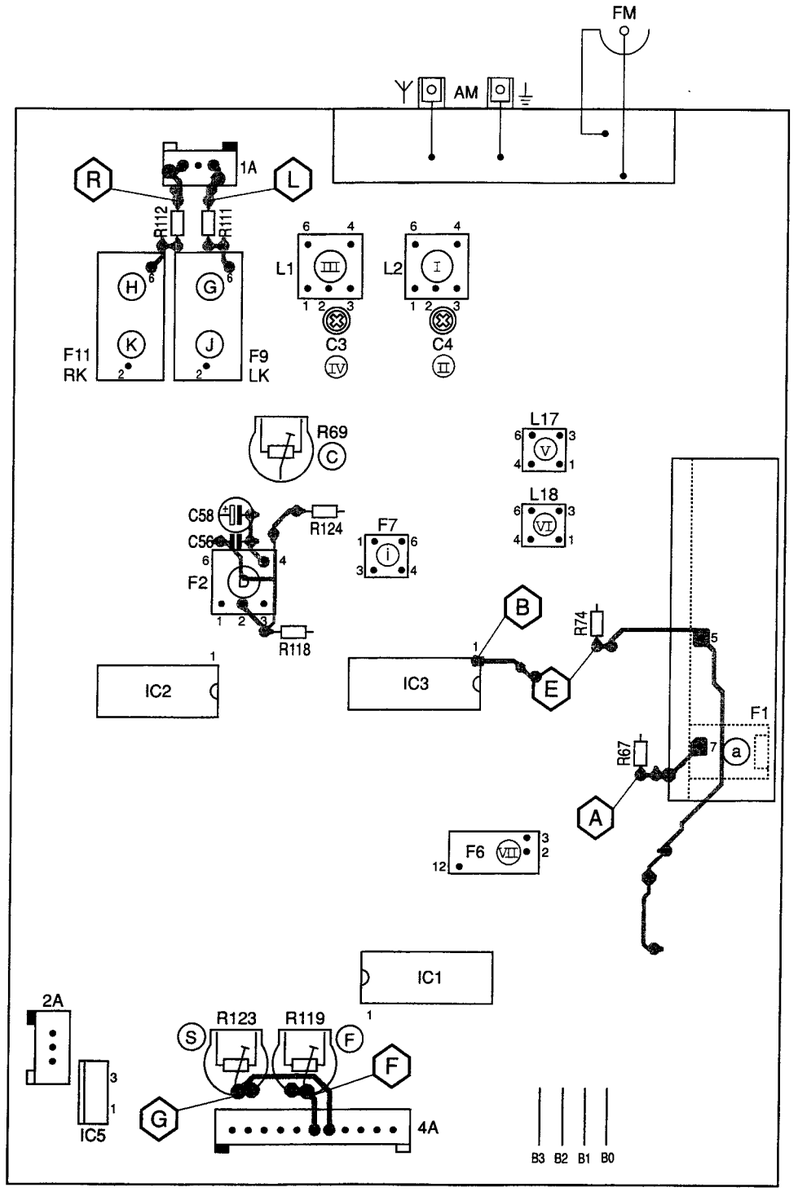
⟨⟩ Measuring points

◯ Trimming point

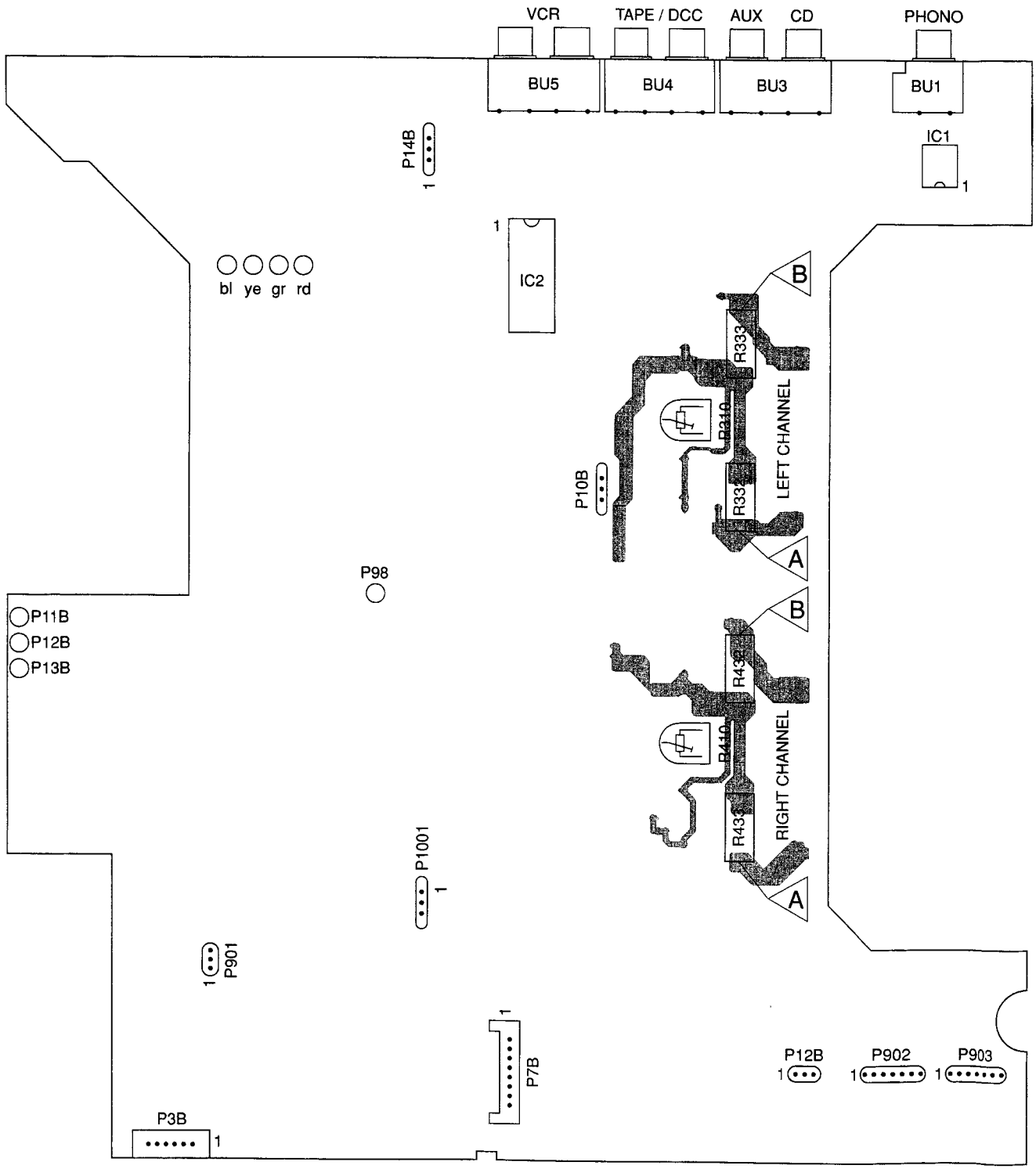
	Jumper				
IF (MHz)	B 3	B 2	B 1	B 0	Filter color
10.6500	0	1	0	0	Black
10.6750	0	1	1	0	Blue
10.7000	1	0	0	0	Red
10.7250	1	0	1	0	Orange
10.7500	1	1	0	0	White

0 = jumper open 1 = jumper closed

5.4 Tuner Alignment Points



5.5 Amplifier Alignment Points



6. ELECTRICAL PARTS LIST

(VERS. :VERSION, U:U.S.A., F:JAPAN, K:FAR EAST, **:EUROPE)

POS. NO	VERS.COLOR	PART NO. (PH)	DESCRIPTION	PART NO. (MZ)
			CAPACITORS	
C3		482212560222	TRIM.CAP. 4.5-20pF	QP12560222
C4		482212560223	TRIM.CAP. 7.5-45pF	QP12560223
C545		482212481237	ELE.CAP. 10000μF 50V	QP12481237
C546		482212481237	ELE.CAP. 10000μF 50V	QP12481237
⚠ C815	01B/02B/01G/02G	482212611805	CER.CAP.A 3300pF 20%	QP12611805
⚠ C816		482212611805	CER.CAP.A 3300pF 20%	QP12611805
			SEMICONDUCTORS	
D6		532213034052	DIODE 1N4151	QQ13034052
D7		532213034052	DIODE 1N4151	QQ13034052
D9		482213082789	DIODE SVC321SP	QP13082789
D14				
I		532213034052	DIODE 1N4151	QQ13034052
D17				
D19		532213034052	DIODE 1N4151	QQ13034052
D23		482213082789	DIODE SVC321SP	QP13082789
D24		532213034052	DIODE 1N4151	QQ13034052
D25		532213034052	DIODE 1N4151	QQ13034052
D27		532213034052	DIODE 1N4151	QQ13034052
D28		532213034052	DIODE 1N4151	QQ13034052
D29	02B/05B/07B/02G	532213034052	DIODE 1N4151	QQ13034052
D43		532213034052	DIODE 1N4151	QQ13034052
D308		532213030684	DIODE 1N4002 -GA	QQ13030684
D309		532213030684	DIODE 1N4002 -GA	QQ13030684
D310		482213081781	Z-DIODE 3.3V B 0.5W	QP13081781
D311		532213034052	DIODE 1N4151	QQ13034052
D312		532213034052	DIODE 1N4151	QQ13034052
D324		482213030621	DIODE 1N4148WW.	QP13030621
D325		482213030621	DIODE 1N4148WW.	QP13030621
D398		482213030621	DIODE 1N4148WW.	QP13030621
D399		482213030621	DIODE 1N4148WW.	QP13030621
D408		532213030684	DIODE 1N4002 -GA	QQ13030684
D409		532213030684	DIODE 1N4002 -GA	QQ13030684
D410		482213081781	Z-DIODE 3.3V B 0.5W	QP13081781
D411		532213034052	DIODE 1N4151	QQ13034052
D412		532213034052	DIODE 1N4151	QQ13034052
D424		482213030621	DIODE 1N4148WW.	QP13030621
D425		482213030621	DIODE 1N4148WW.	QP13030621
D498		482213030621	DIODE 1N4148WW.	QP13030621
D499		482213030621	DIODE 1N4148WW.	QP13030621
D541				
I		482213081614	DIODE MR752	QP13081614
D544				
D601		482213082743	LED TLHR 4400 TFK	QP13082743
D602				
I		482213030621	DIODE 1N4148WW.	QP13030621
D605				
D606		482213034173	Z-DIODE 5.6V C 0.5W	QP13034173
D609		482213030621	DIODE 1N4148WW.	QP13030621
D611		482213080515	Z-DIODE 5.1V C 0.5W	QP13080515
D612		482213030621	DIODE 1N4148WW.	QP13030621
D701				
I		482213030621	DIODE 1N4148WW.	QP13030621
D708				

POS. NO	VERS.COLOR	PART NO. (PH)	DESCRIPTION	PART NO. (MZ)
D804				
I		532213030684	DIODE 1N4002 -GA	QQ13030684
D809				
D812				
I		532213030684	DIODE 1N4002 -GA	QQ13030684
D815				
D817	01B/02B/01G/02G	482213030621	DIODE 1N4148WW.	QP13030621
D818	01B/02B/01G/02G	482213030621	DIODE 1N4148WW.	QP13030621
D819		532213030684	DIODE 1N4002 -GA	QQ13030684
D820		482213030621	DIODE 1N4148WW.	QP13030621
D821		482213083968	Z-DIODE 15V C 0.5W	QP13083968
D822		482213083968	Z-DIODE 15V C 0.5W	QP13083968
IC01		482220930178	IC LC7218	QP20930178
IC02		482220973434	IC LA3401	QP20973434
IC03		482220971785	IC LA1266	QP20971785
IC04	02B/05B/07B/02G	482220931981	IC SAA6579T	QP20931981
IC05		482220933347	IC LM340AT-12NSC	QP20933347
IC1		482220983163	IC LM833N	QP20983163
IC2		482220972748	IC LC7821	QP20972748
IC502		482220990579	IC MC78L18ACP	QP20990579
IC503		482220990581	IC MC79L18ACP	QP20990581
IC600		482221230842	IR-SENSOR TFMS5360	QP21230842
IC601		482220990583	IC M38172-M4-XXX	QP20990583
IC602		482220990584	IC X24C04	QP20990584
IC801		482220980891	IC MC78M05CT	QP20980891
T1		482213040937	TRANS. BC548B	QP13040937
T2		532213044779	TRANS. BC338-25	QQ13044779
T3		532213044779	TRANS. BC338-25	QQ13044779
T6		482213044197	TRANS. BC558B	QP13044197
T7		482213042121	TRANS. FET 2SK30A-TM-Y1	QP13042121
T8		482213044197	TRANS. BC558B	QP13044197
T12		482213044196	TRANS. BC548C	QP13044196
T13		482213044197	TRANS. BC558B	QP13044197
T15		482213040937	TRANS. BC548B	QP13040937
T16		482213040902	TRANS. BF240	QP13040902
T17		482213040937	TRANS. BC548B	QP13040937
T18		482213040937	TRANS. BC548B	QP13040937
T19		482213044197	TRANS. BC558B	QP13044197
T21		482213040937	TRANS. BC548B	QP13040937
T22		482213040937	TRANS. BC548B	QP13040937
T23	02B/05B/07B/02G	482213040937	TRANS. BC548B	QP13040937
T25		482213040937	TRANS. BC548B	QP13040937
T161		482213041096	TRANS. BC550C	QP13041096
T162		482213041096	TRANS. BC550C	QP13041096
T163		482213061755	TRANS. BC560C	QP13061755
T164		482213040937	TRANS. BC548B	QP13040937
T165		482213040937	TRANS. BC548B	QP13040937
T166		482213041096	TRANS. BC550C	QP13041096
T167		482213044197	TRANS. BC558B	QP13044197
T261		482213041096	TRANS. BC550C	QP13041096
T262		482213041096	TRANS. BC550C	QP13041096
T263		482213061755	TRANS. BC560C	QP13061755
T264		482213040937	TRANS. BC548B	QP13040937
T265		482213040937	TRANS. BC548B	QP13040937

(VERS. :VERSION, U:U.S.A., F:JAPAN, K:FAR EAST, **:EUROPE)

POS. NO	VERS.COLOR	PART NO. (PH)	DESCRIPTION	PART NO. (MZ)
T266		482213041096	TRANS. BC550C	QP13041096
T301		482213061755	TRANS. BC560C	QP13061755
T302		482213044461	TRANS. BC546B	QP13044461
T303		482213044461	TRANS. BC546B	QP13044461
T304		482213061755	TRANS. BC560C	QP13061755
T305		482213044461	TRANS. BC546B	QP13044461
T306		482213063852	TRANS. BC880	QP13063852
T307		482213044461	TRANS. BC546B	QP13044461
T308		532213044779	TRANS. BC338-25	QQ13044779
T309		482213040988	TRANS. BC328-25PHI	QP13040988
T311		482213063851	TRANS. NJH11018	QP13063851
T312		482213063849	TRANS. NJH11017	QP13063849
T361		482213041096	TRANS. BC550C	QP13041096
T401		482213061755	TRANS. BC560C	QP13061755
T402		482213044461	TRANS. BC546B	QP13044461
T403		482213044461	TRANS. BC546B	QP13044461
T404		482213061755	TRANS. BC560C	QP13061755
T405		482213044461	TRANS. BC546B	QP13044461
T406		482213063852	TRANS. BC880	QP13063852
T407		482213044461	TRANS. BC546B	QP13044461
T408		532213044779	TRANS. BC338-25	QQ13044779
T409		482213040988	TRANS. BC328-25PHI	QP13040988
T411		482213063851	TRANS. NJH11018	QP13063851
T412		482213063849	TRANS. NJH11017	QP13063849
T461		482213041096	TRANS. BC550C	QP13041096
T601		482213040988	TRANS. BC328-25PHI	QP13040988
T602		482213040988	TRANS. BC328-25PHI	QP13040988
T603		532213044779	TRANS. BC338-25	QQ13044779
T604		532213044779	TRANS. BC338-25	QQ13044779
T605		482213044461	TRANS. BC546B	QP13044461
T606		482213044461	TRANS. BC546B	QP13044461
T701 I T706		482213040937	TRANS. BC548B	QP13040937
T802		482213040937	TRANS. BC548B	QP13040937
T803	01B/02B/01G/02G	532213044779	TRANS. BC338-25	QQ13044779
T804		482213040937	TRANS. BC548B	QP13040937
T805		482213044197	TRANS. BC558B	QP13044197
T807		482214881194	TRANS. BC640	QP14881194
			RESISTORS	
R69		482210020694	TRIM.POT. A 100KΩ	QP10020694
R119		482210020694	TRIM.POT. A 100KΩ	QP10020694
R123		482210020694	TRIM.POT. A 100KΩ	QP10020694
R186		482210130886	MAIN VOLUME	QP10130886
R300		482210130887	BALANCE VOLUME	QP10130887
R310		482210010075	RES. 100Ω	QP10010075
⚠ R317		482211681858	RES. B 10Ω 5%	QP11681858
⚠ R318		482211681858	RES. B 10Ω 5%	QP11681858
⚠ R321	02B/05B/07B/01G/02G	482211711903	RES. B 1KΩ 5%	QP11711903
⚠ R322	02B/05B/07B/01G/02G	482211711903	RES. B 1KΩ 5%	QP11711903
⚠ R323	02B/05B/07B/01G/02G	482211711904	RES. B 1.5KΩ 5%	QP11711904

POS. NO	VERS.COLOR	PART NO. (PH)	DESCRIPTION	PART NO. (MZ)
⚠ R326	02B/05B/07B/01G/02G	482211711904	RES. B 1.5KΩ 5%	QP11711904
⚠ R334	02B/05B/07B/01G/02G	482211660562	RES. AX0922-GA 10Ω	QP11660562
R400		482210130888	TONE VOLUME	QP10130888
R401		482210130888	TONE VOLUME	QP10130888
R410		482210010075	RES. 100Ω	QP10010075
⚠ R417		482211681858	RES. B 10Ω 5%	QP11681858
⚠ R418		482211681858	RES. B 10Ω 5%	QP11681858
⚠ R421	02B/05B/07B/01G/02G	482211711903	RES. B 1KΩ 5%	QP11711903
⚠ R422	02B/05B/07B/01G/02G	482211711903	RES. B 1KΩ 5%	QP11711903
⚠ R423	02B/05B/07B/01G/02G	482211711904	RES. B 1.5KΩ 5%	QP11711904
⚠ R426	02B/05B/07B/01G/02G	482211711904	RES. B 1.5KΩ 5%	QP11711904
⚠ R463	02B/05B/07B/01G/02G	482211660562	RES. AX0922-GA 10Ω	QP11660562
⚠ R541	02B/05B/07B/01G/02G	482211711898	RES. A 390Ω 5%	QP11711898
⚠ R542	02B/05B/07B/01G/02G	482211711898	RES. A 390Ω 5%	QP11711898
R653		482211192219	RES. R-NET8X47KΩ	QP11192219
⚠ R807		482211170183	RES. B 1Ω 5%	QP11170183
			MISCELLANEOUS	
DP601		482213091507	FL-DISPLAY	QP13091507
F2		482221451727	ANTI BIRDIE FILTER	QP21451727
F3		482215762739	COIL CER. FILTER 70	QP15762739
F4		482215762739	COIL CER. FILTER 70	QP15762739
F6	01B/05B/07B/01G	482224271509	IF COIL CER. FILTER SFL450J3	QP24271509
F7		482215611092	FM-DEM. COIL	QP15611092
F9		482215611104	COIL MPX FILTER LPF-V20	QP15611104
F11		482215611104	COIL MPX FILTER LPF-V20	QP15611104
F601		482224271559	X'TAL 32.768 KHz	QP24271559
L0		482215760207	HF-CHOKE COIL	QP15760207
L1		482215611094	MW DETECTOR COIL	QP15611094
L2		482215611095	LW DETECTOR COIL	QP15611095
L16		482215770423	CHO. COIL AX 0.33μH	QP15770423
L17		482215611091	LW-OSC COIL	QP15611091
L18		482215611089	MW-OSC COIL	QP15611089
L19		482215753632	CHOKE COIL 39mH 5%	QP15753632
L21	02B/05B/07B/02G	482215770178	COIL AX 0309-GA 22μH	QP15770178
L601		482215771739	CHO.COIL433003038991	QP15771739

(VERS. :VERSION, U:U.S.A., F:JAPAN, K:FAR EAST, **:EUROPE)

POS. NO	VERS.COLOR	PART NO. (PH)	DESCRIPTION	PART NO. (MZ)
Q1		482224272294	X'TAL 7.2 MHz	QP24272294
Q2		482224272295	X'TAL RESONATOR CSB456F11	QP24272295
Q3	02B/05B/07B/02G	482224281319	X'TAL 4.332 MHz	QP24281319
Q601		482224272527	RESONATOR CST4.0MGW	QP24272527
⚠ REL701		482228060592	RELAY V23037A0002A10	QP28060592
⚠ REL702		482228060592	RELAY V23037A0002A10	QP28060592
⚠ RL801	01B/02B/01G/02G	482228050076	RELAY G2R117PVUSSV	QP28050076
⚠ S3		482228240298	THERMO. SW 100GR	QP28240298
S301		482227620531	BASS-EQ VOLUME SW	QP27620531
S391		482227613634	PUSH SW	QP27613634
S392		482227613634	PUSH SW	QP27613634
⚠ SI801		482207152001	FUSE GR 200mA/T	QP07152001
⚠ SI802	02B/02G		FUSE 800mA/T L 250V	
⚠ SI804		482207032002	FUSE 2A/T L 250V	QP07032002
⚠ SI900	01B/01G	482207032002	FUSE 2A/T L 250V	QP07032002
⚠ TH801		482228240297	THERMO. SW	QP28240297

NOTE ON SAFETY:
Symbol ⚠ Fire or electrical shock hazard. Only original parts should be used to replace any part marked with symbol ⚠. Any other component substitution (other than original type), may increase risk of fire or electrical shock hazard.